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ABSTRACT

This booklet is the first of a series of 16 booklets that together describe and present findings for a study which involved field observations and a survey of science teaching and learning in American public schools during the school year 1976-77. The study was undertaken to provide the National Science Foundation with a portrayal of current conditions in K-12 science classrooms to help make the Foundation's programs of support for science education consistent with national needs. Eleven high schools and their feeder schools were selected to provide a diverse and balanced group of case study sites. One field researcher was assigned to each site and instructed to find out what was happening and what was felt important in science (including mathematics and social science) programs. To confirm findings of the ethnographic case studies and to add special information, a national stratified-random-sample of about 4,000 teachers, principals, curriculum supervisors, superintendents, parents, and senior class students were surveyed. An overview of the study and project methodology are contained in this booklet along with a discussion of the context of precollege education in America. (MN)

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Booklet 0
Overview

SE 020 476

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Case Studies in Science Education
A project for the National Science Foundation
conducted by CIRCE and CCC
270 Education Building
University of Illinois at Urbana-Champaign

CASE STUDIES IN SCIENCE EDUCATION

BOOKLET O

Chapter A

OVERVIEW OF THE STUDY

Chapter B

THE CONTEXT OF PRECOLLEGE EDUCATION IN AMERICA

Chapter C

METHODOLOGY OF THE PROJECT

Center for Instructional Research and Curriculum Evaluation
and
Committee on Culture and Cognition
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University of Illinois at Urbana-Champaign

January 1978

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The Project

Case Studies in Science Education is a collection of field observations of science teaching and learning in American public schools during the school year 1976-77. The study was undertaken to provide the National Science Foundation with a portrayal of current conditions in K-12 science classrooms to help make the foundation's programs of support for science education consistent with national needs. It was organized by a team of educational researchers at the University of Illinois.

Eleven high schools and their feeder schools were selected to provide a diverse and balanced group of sites: rural and urban; east, west, north and south; racially diverse; economically well-off and impoverished; constructing schools and closing schools; innovative and traditional. They were finally selected so that a researcher with ample relevant field experience could be placed at each. To confirm findings of the ethnographic case studies and to add special information, a national stratified-random-sample of about 4000 teachers, principals, curriculum supervisors, superintendents, parents, and senior class students were surveyed. Survey questions were based on observations at the eleven case-study sites.

The field researchers were instructed to find out what was happening, what was felt important, in science (including mathematics and social science) programs. On site from 4 to 15 weeks they were not required to coordinate their work with observers at other sites. Questions originally indicated important by the NSF or identified early in the field were "networked" by the Illinois team. Efforts to triangulate findings were assisted by reports of site visit teams.

Each observer prepared a case study report which was preserved intact as part of the final collection, and later augmented with cross-site conclusions by the Illinois team. The cost of the study was just under $300,000, taking 18 months actual time and about 6 research-person years to complete.

In the principal findings it was noted that each place was different in important ways, that each teacher made unique contributions. Nationally we found that science education was being given low priority, yielding to increasing emphasis on basic skills (reading and computation). Still, the CSSE-high-school science faculties worked hard to protect courses for the college-bound, with many of these courses kept small by prerequisites and "tough" grading. Only occasional efforts were made to do more than "read about" science topics in most of the elementary schools. Although ninth-grade biology and eighth-grade general science flourished, general education aims for science instruction were not felt vital at any level. Seldom was science taught as scientific inquiry--all three subjects were presented as what experts had found to be true. School people and parents were supportive of what was chosen to be taught, complaining occasionally that it was not taught well enough. The textbook usually was seen as the authority on knowledge and the guide to learning. The teacher was seen to be the authority on both social and academic decorum. He or she worked hard to prepare youngsters for tests, subsequent instruction, and the value-orientations of adult life. Though relatively free to depart from district syllabus or community expectation, the teacher seldom exercised either freedom.

Each of the above statements is only partly correct. This summary is a drastic oversimplification of the circumstances observed by the field people and portrayed in the case study reports. The picture at each of the sites--seen through the experienced but singular eyes of our observer--is a special picture, greatly influenced by the administrators, the parents, and the students encountered; colored with technical, professional, economic and social problems. Somehow the pictures do not aggregate across sites to be either the picture of national education represented by the popular press (though no less aggrieved) or that presented in the professional education publication (though no less complicated). It is an interesting collection.

Robert E. Stake
Jack A. Easley, Jr.
Codirectors

LIST OF CASE STUDY SITES

	Code Name	Description	Field Observer
1	RIVER ACRES	a suburb of Houston	Terry Denny
2	FALL RIVER	a small city in Colorado	Mary Lee Smith
3	ALTE	a suburb of a large Midwestern city	Louis M. Smith
4	BRT	a consolidated district in rural Illinois	Alan Peshkin
5	URBANVILLE	a metropolitan community of the Pacific Northwest	Wayne W. Welch
6	PINE CITY	a rural community in Alabama	Rob Walker
7	WESTERN CITY	a small city in middle California	Rodolfo G. Serrano
8	COLUMBUS	the Columbus, Ohio, school district	James R. Sanders & Daniel L. Stufflebeam
9	ARCHIPOLIS	an Eastern middle seaboard city	Jacquetta Hill-Burnett
10	VORTEX	a small city in Pennsylvania	Gordon Hoke
11	GREATER BOSTON	an urban section in metropolitan Boston	Rob Walker

CASE STUDIES IN SCIENCE EDUCATION--ROSTER

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Chapter A

OVERVIEW

There is no Chapter A. Time ran out. In order to get the final report to the NSF on schedule--at the time the review panel was scheduled to review it, early enough so that it might still be distributed to science educators during the 1977-78 school year--we have submitted it without the Overview.

The Overview would have told how we got involved in this project, how a few of us in CIRCE with colleagues from the University of East Anglia and elsewhere had been trying to improve the portrayal of educational programs as a part of curriculum evaluation studies; had been trying to capitalize more on the fact that professional educators and other practitioners of the modern world make so many of their decisions on the basis of conviction and experience, pressed by the irrationalities of social, political and economic affairs; and had been trying to build upon the hermeneutic and verstehen epistemologies for arriving at an understanding (if not an explanation) of the mechanisms of teaching and learning.

At the same time, a few of us on the University of Illinois Committee on Culture and Cognition were becoming increasingly sensitive to the role of context, (or culture, or circumstance, or fifth-order interactions) in shaping youngsters' personal meanings and understandings of science, mathematics and other subject matters. We were impressed with the work of Jean Piaget; found ways of making phenomenological extensions of his ideas as they pertained to educational problems; and were distressed by the increasing belief, partly based (falsely) on his writing, that education should be structured to speed the hierarchical stages of cognitive experience.

Separately, in the fall of 1975, we were delighted to learn about the National Science Foundation's Request for Proposals asking for 10-15 case studies of science teaching and learning to provide information on the present status of things. This was seen to be needed as part of the needs assessment of precollege science education in America to permit staff personnel to plan further the NSF's programmatic support efforts to the schools.

Our plan faced stiff competition. Ours was a unique plan, in fact risky. Most of the plans submitted followed the RFP more closely, relying on a strong sampling plan to enable the small number of sites to represent science classrooms in the country and relying on formal instruments of interviewing and testing and brief site visits to get the case study data. Our plan relied on a weak sampling plan, choosing some of the sites to allow us to put a first-rate field researcher on site for a much longer period of time, following more of an ethnographic or anthropological style. Qualified, experienced field researchers, we realized, would insist on doing the studies their own ways, rather than work from a uniform methodological and conceptual plan, but we decided that such would be a strength as well as disadvantage, relying on successful past efforts, showing the diversity of the American scene in the same sense of diversity that it is seen by the many different people interested in and concerned about education.

Our sites were to be chosen then partly to fit our research manpower, but we were able to give assurance that we would provide a balance of school clusters that would fulfill some of the purposes for which a strong sampling plan is employed. To further counterbalance our weak sampling plan for the selection of sites we propose to conduct a small national sample to attempt to get confirmation of major findings from the case studies.

Our plan was to describe what we found in a way that would be useful to any other person who could not be there to visit for himself. We were not impressed with our ability to see what others could not, but with our opportunity to be where they could not. And to be cautious and redundant, asking again, looking again, seeing cause and consequence, one way and many ways and describing those several things we saw. We were pleased with how Emile Zola once expressed what we considered out obligation:

> *We no longer describe for the sake of describing, from a caprice and a pleasure of rhetoricians. We consider that man cannot be separated from his surroundings, that he is completed by his clothes, his house, his city, and his country; and hence we shall not note a single phenomenon of his brain and heart without looking for the causes or the consequence in his surroundings . . . I should define description: "An account of environment which determines and completes man." . . . In a novel, in a study of humanity, I blame all description which is not according to that definition.*

All this we would have told about in the Overview.

We were able to win that competition because of the strength of the personnel commitment and in spite of the objections to our lack of prespecification of instruments and issues. Our selection of issues, as would be expected, was to wait, more than most other researchers would wait, until we were well acquainted with the conditions in the field. We slowly put together our list of research questions, concentrating on "emic" issues, paying most attention to the perceptions of teachers, other education people, students and parents there in the ten (and later eleven) clusters of schools.

There were four main groups of people working on the project, the field observers (who wrote the case studies), and site visitors (who spent perhaps 3 days at a site), the issue analysts (who coordinated work across the sites and wrote the assimilation chapters), and the survey researchers. The roster is shown after the title page. As is usually the case we had very many different motives for doing this project. One of the few we all agreed on was that we wanted to show that a multiple case study project could be comprehensive, timely, and useful.

We continually had the problem of dealing with our own predilections. We recognized that we were prejudiced in various ways, such as against letting test scores and other social indicators represent the conditions of a child's mind or a teacher's emphasis or preparation. At the outset we thought generally that inquiry teaching is a superior way of getting children learning about science. Also, that teachers crave better books and materials, that specifying school objectives reduces curriculum to a lowest common denominator, and that culture and circumstance influence teaching and learning to a great extent. We of course found widespread support for most of these views. We deliberately sought counter evidence. We tried to increase the range of people who would influence the choice of what would be observed, and how it would be interpreted. But some of our earliest critics confirmed our fears that we did not adequately constrain our biases.

The bias is more apparent in the assimilation chapters than in the case studies. We chose field observers with a range of views about science education, some we knew to be dissimilar from ours. They had their biases, but being experienced and respected in their work, used the methodological purges of their disciplines and wrote (as best they could) balanced and unclouded accounts of teaching at their sites.

The platform for this project was the eleven case studies. They provided for us and our readers many views of the complexity and particularity of each science classroom. It would be unfortunate if the assimilation chapters encouraged readers to dismiss the importance of particular persons or particular contexts. The assimilation chapters should add to the understandings of the case studies, rather than substitute for them. They introduce new data as well as interpretations of old data. We wanted the reader to summarize all these things for himself or herself. We resisted even the idea of providing an executive summary, but our sponsors insisted. Still, we urge our readers not to be satisfied with the press release or the executive summary, or even the assimilation chapters, but to read at least some of the case study reports.

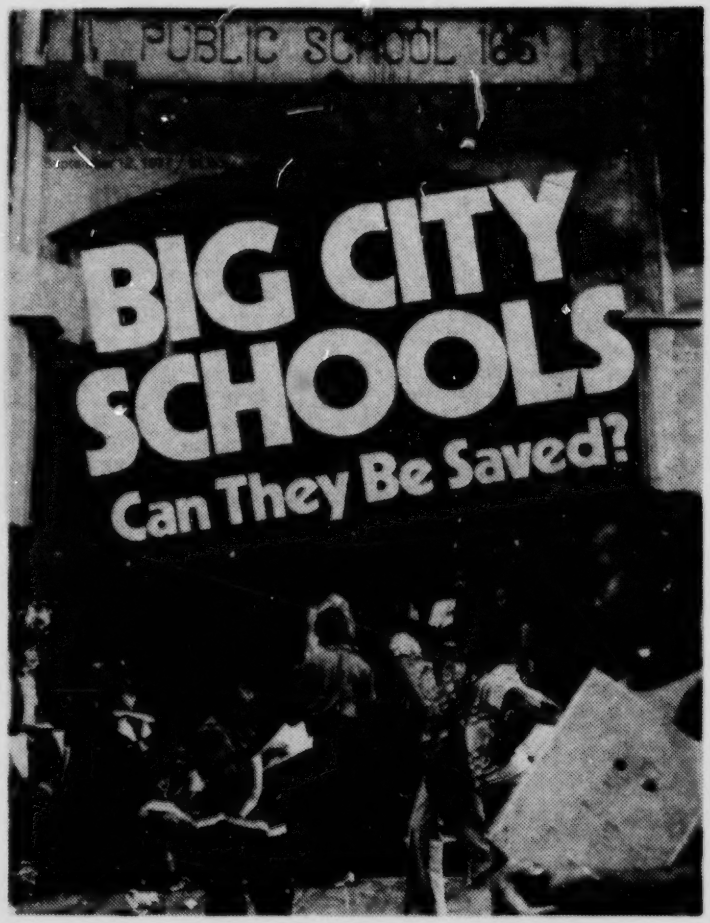
We realized rather early that one of the largest problems would be the coordination of findings from the several sites. We had seen similar projects undertaken by the Center for New Schools and by the Educational Testing Service encountering major time delays and synthesis difficulties because the secondary analysis problems were so great. We decided to rely on a highly informal naturalistic communication system, involving enough curious and compatible people to cover the many happenings but few enough to permit everyone to talk to every one else. That worked out congenially enough but not productively enough. We did not get enough of an exchange about information and issues at the different sites so that field workers could search out possible developments along lines being productively probed elsewhere. After the case studies were completed we spent six months of soaking things up without a satisfactory merging of findings, leaving too much of the essential assimilation for a hectic six weeks prior to the submission of the final report. We did not learn how such a project might be properly organized to handle the synthesis and assimilation of findings from a group of individual case study researchers.

Part of the assimilation difficulties were caused by poor planning, by the failure to allow sufficient time after observations for field-workers to complete their studies. We asked for copy within a few weeks after leaving the field. Observers needed and took much longer. First drafts were scheduled by June 1, but not all were received until October and final drafts were received barely in time to hand out at the oral presentation of final results in Washington in mid-December. Part of the assimilation difficulties were caused by increasing the national survey to 22 groups of respondents, each with some questions unique to it and with item sampling to permit an even greater list of questions--and trying to do this within the assimilation period and within the 3 1/2 months prior to that oral presentation.

All in all we took about 18 months to do the job. It should not have taken so long. It is reasonable to say that the data would have been more useful in 6 months or 12 than they were after 18. We researchers should be able to do a high-quality national status study in a shorter period. Part of the problem was the instrument clearance process. We had a large amount of cooperation and good advice from the CEIS and OMB committees, yet found the process troublesome and delaying. Somehow there ought to be a way to do the sort of study the NSF wanted, one that would help them with policy setting and program planning, within a year.

The need for haste was practical. The circumstances within NSF and between NSF and other federal agencies changed considerably after plans for the study were drawn up. The bureaucracy often acts as if social policy research is independent of the political and personnel change, but a study ideally suited for one time and one agency director is a perfunctory collection of information for another head at another time.

Times continued to change rapidly across the nation and within the nation's schools. After the study was undertaken, accountability of the schools became much less a concern, financial circumstances improved, schools came to realize the demographic changes they would face, and court action became increasingly influential in what a teacher in the classroom would do. (If we fail to get distribution of these 1976-77 observations until the 1978-79 school year they will have less value than they should.)



Part of the value in either year, however, will be to make a point so easily forgotten: that the happenings of the nation's schools are not adequately reported in the popular or professional press. Happy news is not news. Ordinary news is not news. The feature stories in TIME, NEWSWEEK, and other major news media this past fall (1977), stories telling of hostility and violence in the schools, a large amount true in a few schools, was not a picture compatible with the conditions we found.* Boredom was much more common than hostility. Submission was much more common than rebellion. Pride was much more common than vandalism. Hostility, rebellion, and vandalism, though, were known in every corner.

*In a brief story in The Guardian (September 18, 1977) entitled "Hate in the Classroom" reporter Jonathan Steele told British readers "There's peace but not much else in the integrated schools of the U. S. this term."

*I sit in Row 2 and look down across the rows of bent wood seats toward a stage now walled off by heavy canvas curtain. A small American flag and an electric clock mark the presence of time, but most other features mark the past. Now a bell rings and the present comes alive as dozens of students cross the auditorium to pass between classes. A quiet reverberating flow. Teenage boys and girls cast a curious, perhaps friendly glance, walk on. The reverberations come from echoing hallways, the bell again adding to the clamor. Almost every student quiet, but the system a din.**

The quality of science education was, in a sense, very much the same. The national condition had not been well represented by the reports of College Board test scores, by the reviews of North Central or other accrediting agencies, or by expressions of outrage from Admiral Rickover and Frank Armbruster.** The views of such reports and people are important but they are usually greatly incomplete views of the national scene, based upon expectations both arbitrary and parochial. There are many different pictures of science education, many value commitments, even within a small community, certainly in a vast country. We beliive that we captured a more nearly valid national picture of science education in these case studies than have the nation's reporters and researchers, critics, and education's apologists. Quality of science education in the schools, as we found it was seen to be at least "satisfactory," and in many instances "very good," by most school people and parents. It could have been much better, but the obstacles to improvement were many, and the direction of improvement was not something on which there are agreement. If the wishes of citizenry and students had been followed better it is more likely that Mr. Rickover and Mr. Armbruster would have become even more indignant. The question of which philosophies, which values, will control the schools continues even when change in control is unlikely. If it takes a national trauma to give a small canal to its neighbors, to give the schools either to the people or to the science establishment would require an effort beyond comprehension.

We were ever beset with paradoxes; of indoctrinating youngsters to keep our freedoms, of going to extremes to keep things the same, of finding everything changing but all remaining the same. On one occasion it would seem that everybody agreed on what they wanted, but soon again all would disagree. The nation wanted a common classroom for all children, yet wanted each child freed from the constraint of slower and disruptive classmates. We thought about organizing this report in terms of paradoxes, for we found so many in the field. But we did not.

In the methods chapter we speak of "multiple realities." We believe that in reality, reality is multiple, rooted in the different perceptions of people. That does not mean that we consider all realities worthy of equal consideration. In a project such as this we wanted to encounter as may realities as we could, but we concentrated on several appearing more worthy of study than others. We chose a few views to represent the many.

Reality has levels of complexity, of course. But reality, being a creature of those who realize, can be simpler or more complex, depending partly on who is paying attention.

People sometimes ask for a clarification of school goals, and that is no more and no less than they are interested in. It can be as simple as that. And people sometimes ask for a clarification of school goals, and they are there pointing out that children are unwilling to learn, that parents are unconcerned about what the children do, that the learners are unprepared for learning, that teaching is over-demanding, etc., etc. And it is as

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*Site Visitors Report

**Frank E. Armbruster, The U.S. Primary and Secondary Education Process (Croton-on-Hudson, N.Y.: Hudson Institute, Final Draft, 1975). Also College Entrance Examiniation Board. On Further Examination. Report of the advisory panel on the Scholastic Aptitude Test Score Decline. New York, 1977.

complex and diffuse as that, or more. And it may be the same situation and the same people and the same moment on the clock. And it is not that those who see the complexity, "see through" the simplicity; because the situation is not complex until the reality of simplicity is no longer sufficient. It often is.

We have asked large numbers of questions so that individuals could tell us how other individuals, especially large groups of individuals, act or feel. They found this quite difficult to do. They said they did not know. Apparently little sharing of ideas, little joint teaching, little visiting over classrooms had been occurring. Those classrooms were, it seemed, public school but private space. John Goodlad titled his book of the American school curriculum: Looking Behind the Classroom Door.*

We were privileged to share in some of that private space and some of those private realities. We found it comfortable to let the purposes stand for what they were, or to probe until we found other purposes. And paradoxes. And to report them all. We found a paragraph by Leo Tolstoy that helped us understand what we were doing:

> *A bee poised on a flower has stung a child. And so the child is afraid of bees and declares that bees are there to sting people. A poet delights in the bee sipping honey from the calyx of a flower and says the bee exists to suck the nectar of flowers. A bee-keeper, seeing the bee collect pollen and carry it to the hive, says that the object of bees is to gather honey. Another bee-keeper, who has studied the life of the swarm more closely, declares that the bee gathers pollen-dust to feed the young bees and rear a queen, and that is exists for the propagation of its species. The botanist, observing that a bee flying with pollen from one dioecious plant to the pistil of another fertilizes the latter, sees in this the purpose of the bee's existence. Another, remarking the hybridization of plants and seeing that the bee assists in this work, may say that herein lies the purpose of the bee. But the ultimate purpose of the bee is not exhausted by the first or the second or the third of the processes the human mind can discern. The higher the human intellect soars in the discovery of possible purposes, the more obvious it becomes that the ultimate purpose is beyond our comprehension.*
>
> *Man cannot achieve more than a certain insight in to the correlation between the life of the bee and other manifestations of life.*

Those are some of the things we would have said in the Overview.

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*John I. Goodlad, Frances M. Klein, and Associates, Looking Behind the Classroom Door, 2d ed. (Worthington, Ohio: Charles A. Jones Publishing Co., 1974).

Chapter B

THE CONTEXT OF PRECOLLEGE EDUCATION IN AMERICA TODAY

The schools are the offspring of society. They are both the image of society today and the shaper of society tomorrow. In America the shaping impact of schools--as direct influence on individual lives and on the collective life--has diminished. Mass communications (primarily TV, advertising, and contact through travel) have made everyone everyone's teacher. The teacher is but a voice among voices.

Now as much as ever, the society outside school walls shapes the society within--as these musings suggest:

> *The TV hero ignores laws that seem constraining. And even the shy child carries that individualistic, destiny-wresting American ethic to school.*
>
> *The dental hygienist on the billboard wears a white frock and recites "evidence" ringing with authority, yet obviously devoid of logic. And the school teacher, even while abhoring the deceit of advertising, steps in and out of the same recitation.*
>
> *The employee--whether father, mother, or youngster--works loyally to fulfill some kind of production quota. And the student hands in a weekly homework assignment that fulfills "the contract" and keeps open the option of a someday admission to college.*
>
> *Shoplifting has become an economic rather than a moral issue. The only deterrent to looting is the possible brief pain of apprehension. The merchant's price is now generously increased to accommodate the likelihood of loss. And the child in the nearby school treats school property --window panes and books alike--as neither a matter of common-privilege ("to injure it is to injure me?") or of moral consideration.*
>
> *The politician presents himself as a man of the people. He/she promises not so much to protect each individual within his own customs and beliefs, but perhaps to help get special tax breaks for this and that group. And the school superintendent talks of common mastery of precise skills rather than the uniqueness of personal understandings in an education.*
>
> *The basic personal reaction to people like yourself: black, or businessman, or hitch-hiker, or woman, or citizen-band contact, is empathetic and genial. Other persons remain "unseen," tho sometimes suspected. It is the same in and out of school.*

Many parallels. The school is still a crucible, with outside values poured generously in. But the outer society does not determine the inner. Rob Walker's case study (GREATER BOSTON) makes the point magnificently, "the school walls are thick." You do not know what's inside by looking around outside. The teachers and students and administrators cannot turn a meagre lot into a charmed lot, but together they can make whatever they have a good place or a bad place to live and learn. (Our case studies show more good than bad.) Schools are captured in their environments--yet where the human chemistry is right, any nook or cranny can provide a rich opportunity to learn.

Many people wish schools were something other than what they are, but by and large, neither student nor parent nor teacher displays a longing for the school to be different from the society immediately surrounding.

Are they disillusioned? Perhaps it is the legacy of the strong emphasis on education in Lyndon Johnson's War on Poverty. Almost nobody "out there" expects the schools to lead the way to improve the social condition.* Realistic maybe, for the schools collectively are so much a part of that condition.

"Technological change demands social invention," said Victor Fuchs,** "if stability is to be maintained." But it is difficult for established societies to create new social inventions to solve their problems. We have tried. Title III of the National Defense Education Act and the National Institute of Education's dozen or so Experimental Schools, while succeeding in creating several new gardens, failed to reclaim worn-out lands. Few enduring, procreating, problem-engaging institutions resulted. Probably not because the design or funding was inadequate, but because theirs were the answers such few people were looking for. Few of the innovative designs acknowledged the fact that schools as they are are the paymaster and the stage for personal identity and aspiration of over 3,000,000 professional educators.

We begin a collective consideration of our Case Studies in Science Education by examining the general conditions in and around American schools today.

HARD TIMES - TOUGH NEGOTIATIONS

Times are hard in the schools. Money is scarce. Less so in communities like Phoenix and Fairbanks and Cheyenne, but even there we find squeezes.

It is not now so much a matter of a depressed economy. That was the key problem five years ago and remains one particularly in the industrial cities of the Northeast. Now the lack of money is more because state-funding of schools (40% of U.S. school costs are paid by the state)*** largely is linked "by formula" to enrollments, and enrollments are dropping some 2% each year.**** The costs of running schools do not drop when fewer children show up. Just as with the household budget, it is hard to make ends meet.

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*According to a 1977 Yankelovich survey, America's least affluent parents feel they cannot depend on schools for educating their children. More than four out of ten parents feel they cannot even rely on schools to teach children how to read and write. See the General Mills American Family Report on Raising Children in a Changing Society, a survey conducted by Yankelovich, Skelly and White, Inc. and reported in Intellect 106 (November 1977): 177-179.

**Victor Fuchs, The Service Economy. National Bureau of Economic Research (New York: Columbia University Press, 1968), p. 124.

***National Center for Education Statistics, Statistics of Local Public School Systems, 1972-1973 (U. S. Government Printing Office, 1976).

****(From the high point of national enrollment, 1971) National Center for Education Statistics, Digest of Education Statistics (U.S. Government Printing Office, 1975), Table 29, p. 36; and National Center for Education Statistics, Education Directory, Public School Systems, 1975-1976, (U.S. Government Printing Office, 1977), Table 1, p. xvi.

Some would say a time of diminished enrollments (it will last throughout most of the 1980's) should be a time of taking stock, planning, weeding out poor teachers and programs --and to some extent it is. But schools are more institutions for providing work for adults than they are institutions for providing training for children, and where hard times force a choice between the two--assuaging the work force is taking precedence.

Even with vastly higher prices for supplies--much due directly and indirectly to the oil crisis--labor costs continue to rise faster than other costs. The response of private industry is to automate and/or hire teenagers, as McDonald's and Safeway and Bank of America have done. More and more schools are looking for similar solutions. Superintendents talk about using good business accountability and refer to education as a matter of "production."

During the last fifty years of U.S. commerce, breadwinners have been driven out of production, out of merchandising. Many of the most literate now work to design, program, or ballyhoo the machines and teams of part-time help who do the work. Others have sought work increasingly in public agencies, including the schools. Superintendents and teachers alike have established work rules that in effect protect them from the "efficiency expert." Their arguments are not only self-serving, to be sure. The efficiency expert is often among the most naive as to what an education is, educators at least more the expert there. But school people seek ways that are kind to both teacher and learner, and the alternative costs of schooling are not weighted carefully in the equation.

It is easy to perceive the schools as part of the jobs program provided by government because private industry cannot or will not employ the huge number of well-educated clerical-managerial workers in America. In at least two of the sites we visited and in many communities the schools have the biggest payroll in town. If there were suitable alternative jobs for teachers, the schools could consider more alternative ways to operate (it certainly might be decided that teaching should become more personalized rather than less) and could perhaps revitalize the instructional program. But there are not and they cannot.

A combination of tough collective bargaining and worsening fiscal constraints is affecting the K-12 curriculum. The VORTEX and URBANVILLE case studies pinpoint the conditions--but such were evident in all our urban sites. Adjusting to the economic circumstances is largely a political process, less a pedagogical process.

Fewer school-age children. CSSE field observers were in the field studying school programs during the 1976-77 school year. National high-school enrollments for that year were the highest they had ever been. The junior high and middle school enrollments were down a bit, and the elementary school enrollments were starting to bottom out after a decade of decline. Because the schools had learned how to deal with crowding, rather little attention was being paid to the large numbers of high school students. Because the schools had not learned how to deal with diminishing enrollments, there was much concern about the adjustments in elementary school programs. Conditions varied a great deal from site to site, but the growing problems of declining enrollments were anticipated in most of these schools and others around the country.

Secondary schools will feel the forthcoming enrollment drops even more than the elementary schools have. Secondary programs are more fragmented and specialized, making them more dependent on a steady flow of students and funding, more vulnerable to the population cycles. The readjustment of secondary school programs will be more dramatic due also to the differences in organizational structure.

Some areas of the curriculum will suffer more than others. The enrollment changes will have greater effect upon courses of study based upon changing need and interest, for example, in science and mathematics. RIVER ACRES in Texas was an exception. In many places there is serious drop-off in enrollment in history and political science, on one hand, and growing interest in the electives of psychology, sociology, and anthropology. Department chairmen in California told of a great interest in sociology. Their remarks underscored a comment on enrollment by a curriculum supervisor in Milwaukee.

> *Civil rights has had a tremendous impact on social studies. Law and Urban Studies are the two biggest areas now. Government as such is not faring well with kids--almost dropping out of sight, economics too.*

The "biggest problem" facing the social sciences, he suggested, is to preserve choice for students striving for a sense of racial or ethnic identity while retaining a core of civic cohesiveness. His words proved to be prophetic: budget cuts in many of the sites were forcing boards to collapse multiple sections of the high school program into fewer areas of electives--again particularly noticeable in URBANVILLE and VORTEX--or to increase class size and the numbers of instructors teaching in more than one field, as in WESTERN CITY.

Elementary schools were trying to respond to the same pressures by closing schools and realigning attendance boundaries, threatening older areas with loss of "their" school, and precipitating board vs. neighborhood skirmishes. Given the additional thrust of desegregation mandates, such as in our GREATER BOSTON and Alabama sites, it is apparent that urban and rural settings alike are witnessing fundamental changes in the relationships of public schools to the communities they serve.

There is a very personal side too. "Riffing" is a term applied to "reductions in [teaching] force." The way it usually works is that the most junior teachers are fired each spring; the more senior of these are rehired in August, and assigned to a school where enrollments permit it. Naturally it is a trauma, and not only just for the younger teachers. In URBANVILLE, riffing triggered a strike as the school year began. Riffing adds to the growing complexities and stridency of collective bargaining. In a state where there has been a collective bargaining law for at least two years, 14% of 71 superintendents told us that reassignment of teachers has become a much larger issue due to the collective bargaining agreement.

New agreements between school boards and teachers unions are reflecting the concern teachers have about placement, such as does this language from the agreement at our VORTEX site:

Article 47

The Permanent Substitute

1. *A substitute teacher who fills a vacancy for a full year in the VORTEX Public Schools and who commences his assignment prior to October 1, shall be deemed a permanent substitute.*

2. *When a permanent substitute's assignment is concluded during the school year, he will be given five (5) days notice of the termination of the assignment.*

3. *When a permanent substitute's assignment is concluded during the school year, he will be assigned to any other vacancy in his*

field. If no vacancy exists, he will receive per diem assignment with permanent substitute benefits for the remainder of the year.

4. *No permanent substitute shall be required to perform any task not required of a regular teacher.*

5. *Permanent substitutes shall continue to be included in the teachers' insurance programs.**

Combined with a general surplus of teaching candidates throughout the nation, riffing fashions a dismal harbinger for efforts to put the best teacher in places most needed.

Other issues, once never considered are joining salaries, out-of-class duties and class size on the negotiation docket. Tenure by building, rather than by district (to limit cross-town reassignments), is such an issue--but now at least temporarily sidetracked by an August 1977 ruling by Judge Parsons of Chicago's Federal District Court.**

With such activism teacher associations are becoming stronger--even with a surplus of unemployed teachers registered at placement bureaus. Over 80% of all precollege teachers belong to an affiliate of the National Education Association or the American Federation of Teachers. There were 468 teachers strikes (by one count) in the nation's schools in the calendar years 1973 through 1975.***

As they get stronger the teacher unions find increasing dissension within the ranks. Some groups strongly maintain the professional ethic, that the welfare of the child comes first and that instructional reorganization is a union's top priority; others push harder in the trade union tradition for raising certification standards so as to admit fewer teachers to the profession. In many communities the leadership is being pressed by a belligerent subgroup to press for greater demands.

As developed in the assimilation chapters of this report, the picture of instructional programs in U.S. schools is one of great inertia--unmovable fixedness and unstoppable transformation. Yes, both.

The times call for utmost flexibility of institutional response, but the flexibility is seldom there. There are strong indications that the budget constraints and declining enrollments are blending with collective bargaining to restrict maneuverability. And bargaining inside the schools seems likely to become more identified with the general

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*1976-1979 contract agreement between VORTEX School Board and VORTEX Federation of Teachers, pp. 28-29.

**Chicago Daily News, 15 August 1977, pp. 1 and 4.

***For example, out of the 255,899 graduates who completed teaching preparation in 1975 the 192,700 seeking employment exceeded by 90,950 the number of positions open (101,750) (NEA Research Memo 1976-2, June 1976). Sources for other figures in this paragraph were: National Education Association, "Status of Teachers and NEA Members, Special Memo I-6" (Washington, D.C.: NEA Research, July 1976); HEW, National Center for Educational Statistics, "Advance Report, Fall 1975 Statistics of Public Schools"; and U. S. Department of Labor, Bureau of Labor Statistics, "Work Stoppages Report," Nos. 483 (1975), 453 (1974), 437 (1973), (Washington, D.C.: U. S. Government Printing Office).

realm of public sector negotiations--with educational costs viewed as an integral part of municipal budgets. A brief overview of mid-1977 developments in four states attests to the gravity of school-related issues.

Tennessee--The legislature was considering a bill to revise the state's funding formula to give systems with more pupils more state money, while at the same time guaranteeing smaller districts wouldn't lose funds.

Illinois--Governor James Thompson had appointed a 23-member commission to consider the effects of state-required programs on school boards and local governments. He said a major problem local communities and school districts now face is sustaining state-mandated programs that aren't adequately funded.

Kansas--New legislation had been adopted which allows citizens to protest school closings and even petition for a referendum on the school board's decision. The new law requires any school district to publish reasons for closing a school, name of the school and names of schools to which pupils would be reassigned. Public hearings are required within 45-60 days of such a resolution, and if at least five per cent of the registered voters in the school district field a petition protesting the closing, a general election would be required.

Pennsylvania--Governor Milton Shapp was expecting a report from a special commission established in December to review the state's public employee bargaining law, which guarantees state and local government workers the right to strike and teachers the right to unionize.

The Pennsylvania State Education Association would like to see impasses resolved with binding "best offer" arbitration. That approach, however, was strongly opposed by both the Pennsylvania School Boards Association and the Philadelphia Federation of Teachers.

Historically, public schools have been regarded as a major contributor to the welfare of the total populace despite their focus on children and youth. In an era of community, state, and federal priorities in flux, an era of fewer youngsters and more oldsters, how the schools will fare is one of the seminal matters confronting this society.

THE CITIES AND THE SUNBELT

The CSSE project was conducted at a time of high levels of unemployment, inflation, energy use, and constraint on budgets. The school age population was declining. Only thirty-four out of seventy-four superintendents in the CSSE national survey responded that the science curriculum in their district had not been affected by budget cuts recently. Major demographic shifts were also apparent throughout the United States--a promising explanation for some regional variation in science teaching and learning.

Comparative analyses of the case studies will underscore the importance of a presentation made by a Rand demographer, Phillip Morrison,* at the 1977 meeting of the American Association for the Advancement of Science:

> *The essentially private and unregulated movements that make up migration flows are now being scrutinized for the newly perceived costs they create, both at origin and especially at destination.*
>
> . . .
>
> *This new dispersal of population, coupled with a sharp slowdown in over-all growth due to a lower birthrate, has altered local and regional population growth rates. The new patterns are having significant fiscal, social, and political repercussions.*

Much of the movement is "white flight" from the Northeast to the lure of the "Sunbelt," that area ranging from Georgia and Florida across the Gulf states, through Texas, New Mexico, and Arizona to southern California--and by some calculations including Colorado, Virginia, and Washington, D.C. The end of nearly three and a half decades of heavy military involvement in the Pacific, the nation's increasing reliance on truck transportation, the coupling of low pay with rising educational levels in the South, and the first non-agricultural population gains in many rural areas are the circumstances noted in the 1976 Report on National Growth and Development.**

Three tables illustrate the changes. In Table B-I we show population changes in large metropolitan areas between 1960 and 1974. In Table B-II we present percentages of the total U.S. population by size of place for 1950, 1960, and 1970.

Population changes already underway reveal that in the years immediately ahead a trio of factors will probably levy great influence on public affairs, including education. For several years increased numbers of young people will be starting households and seeking full-time employment. The number of older people is increasing. A substantial decline in public school enrollments has begun. In Table B-III we portray projected population changes by age groups over the next fifteen years.

As can be inferred from these data, the out-migration from northern cities is both to outlying rural areas in the same region and to the Sunbelt. In effect, the migration is creating new urban centers in the South and shrinking the existing ones in the North. The educated white migrants from northern cities to new suburbs and to the Sunbelt partly comprise what has been called "the middle-class poor" who extend their credit limits to buy homes and maintain middle-class ideals. Most are working at least as hard as ever.

The "white flight" has left behind something of a population stagnation in most inner cities, especially those in the Northeast. The destitute predominantly non-white inhabitants of places like Watts in Los Angeles, Bedford-Stuyvesant in New York City, the

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*The Scranton Times, 22 February 1977, pg. 7.

**Washington, D.C.: U.S. Government Printing Office, 1976.

Table B-I: Population Change in Metropolitan Areas Between 1960 and 1974*

Standard Metropolitan Statistical Area	Average Annual Population Change	
	Migration 1960-1970	Migration 1970-1974
Sunbelt		
Albuquerque, New Mexico	+ 1700	+ 7000
Anaheim-Santa Ana-Garden Grove, Calif.	+55300	+ 44300
Atlanta, Georgia	+23300	+ 25500
Denver-Boulder, Colorado	+16500	+ 22800
El Paso, Texas	- 2900	+ 5300
Houston, Texas	+31700	+ 28300
Los Angeles-Long Beach, California	+26900	- 82500
Memphis, Tennessee, Arkansas, Mississippi	- 400	- 4300
Miami, Florida	+25500	+ 32500
Pheonix, Arizona	+19000	+ 39000
Other		
Bakersfield, California	- 500	- 1500
Boston, Massachusetts	NA	NA
Chicago, Illinois	+ 1800	- 56500
Detroit, Michigan	- 1700	- 38800
Fort Wayne, Indiana	+ 1200	- 1000
Indianapolis, Indiana	+ 3800	- 3800
Jersey City, New Jersey	- 4600	- 8500
Milwaukee, Wisconsin	- 3700	- 6800
Minneapolis-St. Paul, Minnesota-Wisconsin	+11800	- 6500
New York, N.Y. - New Jersey	-31900	-125500
Peoria, Illinois	- 800	- 300
Philadelphia, Pennsylvania-New Jersey	+ 5700	- 27800
Pittsburgh, Pennsylvania	-16600	- 22300
Salt Lake City, Utah	+ 800	+ 1800
Seattle-Everett, Washington	+18800	- 15500
St. Louis, Missouri-Illinois	+ 2400	- 26300
Trenton, New Jersey	+ 1200	+ 2000
Washington, D.C.-Maryland-Virginia	+42700	- 3500

*Adapted from U.S. Bureau of the Census of Population and Housing. PHC (2) General Demographic Trends for Metropolitan Areas, 1960 to 1970, Characteristics of the Population, Part 1, United States Summary; and Current Population Reports, series P-25, No. 618.

Table B-II: U.S. Population by Size of Place
for 1950, 1960, and 1970*

CLASS AND SIZE	PERCENT OF TOTAL POPULATION		
	1950	1960	1970
United States	100.0	100.0	100.0
Urban	64.0	69.9	73.5
Places of 1,000,000 or more	11.5	9.8	9.2
Places of 500,000-1,000,000	6.1	6.2	6.4
Places of 250,000-500,000	5.4	6.0	5.1
Places of 100,000-250,000	6.4	6.5	7.0
Places of 50,000-100,000	5.9	7.7	8.2
Places of 25,000-50,000	5.8	8.3	8.8
Places of 10,000-25,000	7.8	9.8	10.5
Places of 5,000-10,000	5.4	5.5	6.4
Places of 2,500-5,000	4.3	4.2	4.0
Places under 2,500	0.4	0.4	0.4
Unincorporated parts of urbanized areas	4.9	5.5	7.5
Rural	36.0	30.1	26.5
Places of 1,000-2,500	4.3	3.6	3.3
Places under 1,000	2.7	2.2	1.9
Other rural	29.0	24.3	21.3

*U.S. Census of Population: 1960 and 1970, Vol. 1, Tables 19 and 20 (Washington, D.C.: U.S. Department of Commerce, Bureau of the Census).

Table B-III: Population Changes by Age Groups, United States, 1972 - 1990*
(Percent Change Based on 1972 Population)**

Age Groups	Projected Change by 1980	Projected Change by 1990
All ages	+ 6.2%	+14.5%
Under 5 years	- 2.4%	+ 3.0%
5-17 years	-11.7%	-13.4%
18-24 years	+13.0%	- 3.8%
25-34 years	+35.1%	+52.8%
35-44 years	+11.4%	+62.0%
45-54 years	- 5.0%	+ 4.3%
55-64 years	+10.4%	+ 6.6%
65 and over	+14.8%	+32.6%

*National Growth & Development: 1976 Report (Washington, D.C.: U. S. Government Printing Office, 1976), p. 37.

**Assumes 1.8 average births per woman in childbearing ages 15-44. However, fertility rate dropped again in 1976 for fifth consecutive year.

West Side of Chicago, and parts of Boston, Detroit, Washington and even Atlanta were featured in the August 29, 1977 edition of Time in an article entitled "The American Underclass." The authors claimed that the underclass presents our most dangerous crisis, more dangerous than the depression of 1929, and more complex."

> *A most crying long-range need is to improve public education. As the poorest of the poor have inundated inner-city schools, it has been easier for educators to concede the trappings of success: passing grades, graduating doplomas, than to teach the skills necessary for living and working. Ghetto school officials need to enforce their lax truancy rules, putting more pressure on parents to insist that their children attend, and need to concentrate rigorously on the reading, writing, and math skills required to get ahead in an advanced society.**

Such simplistic solutions to the problems are found in all the media, and in many of the CSSE quotations. How easy to say "enforce truancy rules." Does it take into account that most teachers are white and not living in the areas of urban decay? Or the absence of jobs or promise of jobs that will help youngsters from deteriorated neighborhoods escape? There is indeed a great problem--with a full mix of education and economic factors. Remedying the education side without remedying the economic seems greatly unlikely. The South Goes North** offered insight into the migration of millions of farm workers from the South to the throbbing urban centers of the North between 1940 and 1960. Mechanization of agriculture and employment opportunities for the unskilled in urban factories and the outgrowth of World War II were forces that increased minority pupil populations in the urban-metropolitan areas, particularly of the northeast lake fronts and seaboards of our country. From the influx into the large urban school systems of the children of the newly-arrived minority families emerged new and different student behavior. Blackboard Jungle and High School Confidential*** vividly portrayed the inability of inner-city schools to adapt to the culturally changing school populations. This change included the cultural reactions of the minority and non-minority children whose families were not new to the transitional neighborhoods; West Side Story**** exemplified ethnic ("non-minority") reaction to the influx of Puerto-Ricans to certain New York City neighborhoods.

Teaching the poor. In the sixties federal funding to ghetto schools increased the number of pedagogical personnel to teach the growing and changing student population. Universities were obligated to prepare teachers capable of going into ghetto school districts to provide minority children with the educational opportunity equal to that enjoyed by white children in the suburbs. The task was too difficult. Teachers Talk***** documented the frustrations of beginning elementary school teachers as they were inducted into ghetto school staffs.

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*"The American Underclass," Time, 29 August 1977, pp. 18-19.

**Robert Coles, The South Goes North, Volume III of Children of Crisis (Boston: Little, Brown and Company, 1967).

***Evan Hunter, The Blackboard Jungle (New York: Simon and Schuster, 1954) and Lewis Meltzer and Robert Blees, High School Confidential, MGM, 1958.

****Arthur Laurents, West Side Story (New York: Random House, 1958).

*****Estelle Fuchs, Teachers Talk: Views From Inside City Schools (Garden City, N.Y.: Doubleday & Co., 1969).

As the failure of centralized school boards to provide for the education of poor and disadvantaged minority groups became apparent there emerged a strong advocacy for decentralization and local community control. The Ocean Hill-Brownsville school district in Brooklyn drew America's attention: parents demanded participation in selection of the school staff.

Through 1970 the northern inner-city ghetto school was often a modern building looking out-of-place among dilapidated tenement houses. Steel doors and wire mesh window coverings by then were common. Many teachers were fresh out of college and began experiencing difficulties with discipline in classrooms comprised primarily of city-born and newly arrived minority children. These children seemed to have little of the motivation of the docile and well-read children of the teacher training classroom. While northern cities were still thriving many students dropped out of school and were able to gain unskilled employment. The job situation changed. Youngsters who dropped out or were expelled were not able to find employment. The schools were still not able to transform disadvantaged youth into the model students envisioned by employers, college admissions officers, newspaper writers and most other adults.

Many middle class families were leaving the cities to live in the suburbs and more lately in the Sunbelt. Business and industry were leaving the big cities and the out-migration of middle class families gathered new momentum, further eroding the tax base. Declining elementary school enrollments contributed to the need to constrain budgets for education in the cities as elsewhere. Cutbacks in resources and lay-offs for pedagogical and ancillary staffs upset urban classroom dynamics further. Confusion, fear and general loss of security was experienced by students, teachers, administrators, parents and communities. Teacher unions felt internal contention as teachers of different subject areas and levels allied themselves against one another--particularly as to what seniority system would come into effect during the imminent teacher lay-offs.

Students who were previously marginal about their commitment to learn in school were less disposed than ever to make the best of the classroom scene. Many would sneak out by one of the many exit doors--as in a CSSE high school in GREATER BOSTON (site visit report). A change in curriculum, "back to basics" seemed to some like the most promising option in light of the decaying conditions and the public's outcry against funds spent for well-intended but failing program innovations. In 1977, after years of deterioration, urban school systems are in great distress--but each of CSSE urban sites have reported signs of new stability.

But arrest of deterioration--even if true--is little cause for celebration. Urban areas continue to decay; immigrants continue to arrive and transients move into neighborhoods that were fairly stable only a few years ago. We find new waves of transitional neighborhoods, already decayed but still getting worse.

The Sunbelt from 1940 to 1960, experienced the out-migration of both highly educated people and farm workers, bound for Detroit and the industrial cities. But since 1960 many of the highly educated departees have been replaced by highly educated northern arrivers. An agricultural revolution drastically reduced the number of farmers, leaving many, especially blacks, unemployed and unable to adapt to non-agricultural employment. And still today many of the illiterate youngsters and old people are concentrated in the poorest sections of the Old South. The growth of the northern cities in the sixties seems to be mirrored in the southern cities in the seventies.*

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*James F. Doster, "The Old Way and the New" in The Rising South, ed. R. H. McKenzie, (Tuscaloosa: The University of Alabama Press, 1976).

For the northern cities President Carter's aides have predicted a greater federal emphasis on neighborhood preservation.* The youngsters of the inner city underclass might benefit from the relevance in learning, understanding and experiencing a "science" of neighborhood preservation. For the cities of the Sunbelt, is there any way to avoid the mistakes made previously in the North? Can good schools be maintained along with a strong commitment to equal educational opportunity during this period of growth? The same dysfunctional classroom dynamics that occurred in northern cities may occur in the Sunbelt cities--particularly if northerners migrating south take along that common mind-set: "Well, first, I'm going to get mine."

THE SCHOOL AS SURROGATE

Ruth Love, Oakland's distinguished superintendent and former director of the "Right to Read" program recently told an audience of administrators and school board members that "Public schools are being asked to do things we used to pray to God for."** Few seem to feel that the response now is any livelier than it was before. Precollege education may be asked to do things once left to the Almighty, but its central place in the American aspiration faces strong challenge.

Historian Henry Steele Commager,*** in a chapter titled "The School as Surrogate," described the demands this way:

> *In the past we required our schools to do what in the Old World, the family, the Church, apprenticeships, and the guilds did; now we ask them to do what their modern equivalents, plus a hundred voluntary organizations, fail or refuse to do. Our schools, like our children, are the victims of the failure of our society to fulfill its obligation to paideia.*

This is not to say that the modern equivalents are inactive. The libraries are bustling, rebuilding. Sesame Street and other children's educational television programs have a wide audience. "Scout troops," 4-H clubs and "Outward Bound" still continue to dispatch youngsters on educational adventures. Girls' athletic programs are booming, thanks to federal equal opportunities legislation, giving young women educational experiences and acculturation long available to young men.

But getting an education from these is somewhat like learning science from Ripley's Believe It or Not. Sooner or later the facts and great ideas are all there, but disjointed, without the profound sense of relationship that comes with an apprenticeship or a good collection of readings or course of study. The Beatles, Archie Bunker, First Officer Spock, and the Fonz have contributed to a million liberal educations, escapist to be sure, but

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*"Answering the Cities' Cries of Distress," U.S. News & World Report, 13 December 1976, p. 30.

**Gordon Hoke, Report on the Annual Meeting of the American Association of School Administrators, February-March 1977, at Las Vegas, Nevada. Reprinted in CSSE P. 11:41.

***In School Worlds '76: New Directions for Educational Policy, ed. Donald N. Bigelow (Berkeley: McCutchan Publishing Co., 1976), p. 23.

liberating youngsters from old sanctities and ideals dear to the sixth grade teacher. The modern equivalents are at work, Professor Commager, but as you said, not supplanting the school in caretaking American education.

How to share the role of the community-wide education with other institutions continues to be a puzzlement for the schools. Continuing education and adult education responsibilities have increasingly been assumed by community colleges, even so much so that the YMCA, church groups and others offering supplementary courses cannot compete with the subsidized tuitions of the new program. Here again, the "cottage industries" and "corner groceries" are being driven out of business--whether or not their offerings are better or poorer in quality than those with the modern "delivery system."

The libraries, the park districts, the community colleges, the museums, the cable television contracts (which have municipal regulation) are areas where intergovernmental cooperation with schools is inadequate to the need. Debate over the role of public libraries vis-a-vis public schools sparked the following exchange between two school board members in one of our case study sites.

> *It [the library] is not only one of the remaining founts of culture, but also is a central part of the total education of the students moving through the school system. All the disciplines have at their core the necessity of and access to books. There is no comparable public educational institution in the city or in the school system itself . . . The library must be recognized as an indispensable part of the educational system of the City . . . The school board must increase its funding of the . . . Public Library.*
>
> *It's crazy, really crazy, you know! We started out helping the library in a "crisis year" as a gesture of good will. Now we've caught ourselves, and are expected to increase our aid to other institutions when we can't even cope with our own demands.*

State-Federal requirements. The demands to which the latter speaker referred are the increasing obligations accompanying state and federal programs. These programs are an expression of real social need, but are based on the notion that the schools can do additional social and educational service with little or no change in organization, personnel or funding. "Categorical-aid" programs, in spite of Richard Nixon's effort to get rid of them, continue to grow. They carry enough funding or threat of loss of funding so that, though voluntary, the school cannot really choose whether or not to participate. So the mission of the school grows more expansive and more intricate.

The California program for bilingual education is a case in point. First, this excerpt from an interview with two elementary school curriculum supervisors:

> *Funding provides an aide in every classroom, helps with the class size, and also provides a curriculum specialist at each experimental site. In many cases, it also provides a "community-contract" aide . . . Math and reading people are made available from the district-level office . . . At least twenty [of thirty-six] schools are receiving some form of aid and the number may rise to twenty-four or twenty-five next year.*
>
> *The situation does create problems of management. We dream of management from one source, [but] not management by funding source. There has to be accountability. It should be such that classroom teachers don't have to spend eons of time, filling out forms.*

> *We have some schools receiving aid in several categories--for example, early childhood education, Senate Bill 90, Title 1, Senate Bill 22-84, and now Senate Bill 1329, plus upcoming bills for special education. Each one of these programs has particular areas that it is looking at, areas it wants to measure.*

Our WESTERN CITY report further indicates the welter of categorical programs of federal and state origin. One by one, by direct statement in the legislation or in the subsequent program regulations, each program places a formal planning-accounting-reporting burden on the schools. This burden is no small escalation. It is not easily assumed by the informal planning, accounting, and reporting activities traditionally operating in the schools, nor by the formal planning-accounting-reporting mechanisms of other federal-state programs. Each categorical program can be expected to set forth requirements for a newly designed or renovated bookkeeping operation. The new requirements make good sense, considered ahistorically, without regard to existing operations in the school, but they add greatly to an already encumbered system.

Efforts are being made by the states to get the schools to be more efficient and productive by imposing "accountability" requirements. Led by Michigan in the late 1960's and followed by most states (extravagantly by Florida and Oregon), legislation was passed to get the schools to pursue a more uniform set of objectives and to monitor progress with state assessment testing. Early efforts to link performance to state funding of local districts and to other decision-making were impolitic and impractical. The whole notion that schools can use student performance data to improve district programs has yet to be validated. Furthermore, there is a yet-insufficiently-calculated risk of diminishing the opportunities to learn concepts and relationships by emphasizing the facts and basic skills covered by the tests. As House* has demonstrated, the "accountability" aim is questionable; the technology is far from adequate.

In analyzing Gallup Poll data regarding the public attitude about school accountability, Harry Broudy** said:

> *The school is being asked to change its priorities from cognitive to environmental, personal outcomes. If, as authorities in social work and sociology insist, the most potent forces in these non-cognitive conditions of learning are the home and the community, the accountability of the school for providing them becomes problematical.*

Diverse needs. Teachers are at times expected to be surrogate parents, grandparents, siblings, priests, therapists, wardens, biographers, babysitters, and friends. They are intermediaries for the schools which are at times expected to feed the hungry, restore the deprived, redirect the alienated, energize the lethargic, and calm the hyperactive, as

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*Ernest R. House; Wendell Rivers; and Daniel Stufflebeam, An Assessment of the Michigan Accountability System (1974); reprinted in The Evaluation Center, "Evaluation Series Report #2" (Kalamazoo, Michigan: Western Michigan University, 1976).

**Harry S. Broudy, "The Demand for Accountability: Can Society Exercise Control Over Education?" Education and Urban Society 9 (February 1977):241-242

well, of course, as educate the ignorant, train the naive, and inspire the downhearted. Many school people enjoy the challenge. Others are frustrated.

A junior high school teacher vented his feelings at repeated demands for his school to be a better "melting pot," a meeting place of the cultures, a place to honor the pluralism of our society.

> *I'm not a bigot! I'm not a sociologist!! I don't know the answers. If your concern is that you want a kid to know about science there are ways of dealing with that. But for some you have to make things so simple and "relevant" that there is really no application after that. What's important is that they know English!*

Anti-social behavior is often linked to low self-esteem. The schools are at times charged with the responsibility of developing attitudes of self-worth, personal and group identity. In Milwaukee, they had developed a seventh-grade textbook entitled The American-His Heritage-Rights-Responsibilities.* In it appear these statements:

> *He (mankind) can think about what is here and now, what was in the past, what can be in the future, and what can never happen. Only humans can do these things.*
>
> *Actually, you (the student) will note that all aspects of our culture have been affected by our heritage as a nation of immigrants.*

The longings for brotherhood, for a sense of identity, for a student body free of aggressive hostility are real and to be respected, of course. Unfortunately, when teachers face youngsters having little of a work-ethic, having little fear of the teacher's authority, having little appetite for gaining power through academic learning, having little desire to become more like the teacher is--then the schools have little collective expertise in teaching self-esteem or cultural appreciation.

The following excerpt from our GREATER BOSTON case study (p 11:11) reveals the commitment of some teachers to deal simultaneously both with academic and nonacademic needs.

> David and Steve both find that they need to plan their lessons for the lower ability groups quite differently to the higher ability groups. . . .
>
> Both teachers are working through the part of the Earth Science course that deals with the atmosphere and goes on to look at weather and climate. Both of them are trying to establish the idea that air has substance, and that it has characteristic properties. We have seen how David has set about this problem by having the students work through a number of experiments (which are not all in the text), which cumulatively he hopes will give the students a feel for the key concepts. It is crucial to his approach that the students do the experiments themselves (even if

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*Department of Elementary and Secondary Education Division of Curriculum and Instruction, The American-His Heritage-Rights-Responsibilities (Milwaukee: Milwaukee Public Schools, 1971), pp. 19 and 180.

> they knew what will happen) because the tactile sensations involved are as important as the demonstrations and explanations.
>
> With his low ability group Steve too is trying to get the students making things. But feeling they would be bored by the kinds of air pressure experiments David is doing, he has them making models of atoms using polystyrene spheres. The students could set their own level by choosing which atom to build, and then having coloured the spheres (red for protons, blue for neutrons and white for electrons) had to assemble a model using wire and a wooden base board.

But it suggests too low an incidence of success.

Spokesmen for the schools say they would like to do the many things people want them to do, but they are prevented from doing so by the shortage of funds. Funds are indeed precious, but there is real question as to whether more money would buy better education. Cutbacks in funds for chemistry supplies and for individual instruction on musical instruments are clearly and directly lowering the quality of instruction. However, if full funding were restored, only a small portion would go for those. As indicated in the previous section, most of any newly recovered funds will pay for existing professional services seen now as below a just and deserved wage level.

The need and propriety of additional funding was documented repeatedly in our eleven case studies. In Columbus, Ohio the schools were closed for several frigid weeks last February, partly because natural gas rates went up beyond the ability of the school to pay--not only because the gas was in extremely short supply.

Increased expectation of the schools is seldom matched with proportionate increases in funding. Budgets do actually go up, but not in proportion to the inflation rate or the rise in program goals. So in effect the schools have less cash for purchasing what they would like to have in the way of counseling services, textbooks and duplicating machines. They would like to be able to operate in the style of a central government agency or private business. But most cannot.

And most cannot do the myriad tasks their communities collectively assign them. The public has its eyes on many goals in many different directions, a few of them even in contradiction with each other, such as student attitudinal goals of self-reliance and accepting the interdependence of individuals. We asked high school counselors, a group that sometimes sees themselves as the applied social scientists of the schools, about it this way:

> Parents, students, and teachers--talking among themselves or with others--say what they want the schools to be doing. They say different things, but do they really disagree?*

Essentially none of them told us that people agree about what the school should be doing, though more thought it a disagreement over technique rather than purpose.

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*CSSE Survey

Broad and narrow aims. Teachers know they cannot satisfy their pluralistic publics. They know they will be increasingly embarrassed as the public learns more and more about what they actually spend time on, what the students actually become knowledgeable about. Administrators know it. This realistic reassessment is probably behind the strong teacher/administrator support of a "back to the basics" curriculum.

We were surprised. We expected to find parents and economically-distressed school critics advocating more emphasis on the basic skills of reading, spelling and arithmetic, with teachers arguing back that these skills do not add up to an education--but many teachers were "the advocates" more than anyone else around. Perhaps they wanted to be accountable for an assignment they knew they could succeed at, and to consider that what-else was taught was a bonus rather than a general obligation.

Well, that is one way to deal with the problem. If the expectations of the school are unrealistic, pare them back to the "do-able." Such was the advice several years ago of Carl Bereiter* who contended that the schools are relatively ineffective even at teaching the substantive ideas of science and the humanities, that they should stick to areas where their success has been documented, to the teaching of basic language and arithmetic.

The demands of schools are great, but not impossible. Many teachers, many school districts have been quite successful over the years. The schools in Glendive, Montana; Scottsdale, Arizona; Miami, Florida and Brewer, Maine have lived up to most expectations of the community. Many observers from the outside would scoff at what they consider to be overly modest aspirations. And many citizens within those communities shake their heads in disbelief at things the schools do and fail to do. But most citizens believe (as Gooler** found in 1970) schools should pursue a broad array of goals and that academic responsibilities should continue to be assumed primarily by the schools.

The following exchange occurred in a downstate Illinois kindergarten center on the first day of school. Our observer approached a woman, a mother perhaps at 30-32 years of age. Most of her life had been spent in southern Illinois, though in several communities. She was retained at least once in grade school and dropped out of school in the ninth grade.

> *Mother: When I was a child I fell downstairs. My mother thought it must have harmed me. But we didn't have the money to do anything about it. I don't think too well, but I sure don't think I'm mentally retarded.*
>
> *Observer: (a long question about the importance of students demonstrating a positive attitude toward learning)*
>
> *Mother: Some students have it; some don't. Personally, I hated school. Michael [her oldest, a kindergartener] loves it. He wants to come here even when he's sick. I guess my attitude was poor.*
>
> *I was scared; nervous. Was always made to hurry, to work faster. But I just couldn't work faster, so I was left behind. But the*

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*Carl Bereiter, Must We Educate (Englewood Cliffs, N.J.: Prentice Hall, Inc., 1973).

**Dennis Gooler, "Strategies for Obtaining Clarification of Priorities in Education," (Ph.D. diss. University of Illinois, 1970).

things they [teachers] do now! My, this kindergarten! Schools have changed a lot. My husband and I, and my woman friends, think kids are being treated better today. And I'm learning things in those Head Start parent meetings.

Observer: . . . the reorganization of schools?

Mother: Some parents are against that--what do you call it?--consolidation? Well, you'll have trouble with that. I'm afraid of big schools. I think other people are too.

Observer: . . . what classes would you like?

Mother: I would like to learn more about child care. Also, I don't cook too good. I'd like to know more about foods, about sewing. Kids today have, I guess you'd call "advanced learning." We never had that! I was real good in art and music. Liked them. Had lots of fun in those classes. But I just wasn't too fast--not too much learning. Guess I'm slower than others. I was always behind.

Observer: . . . office of the state superintendent in Springfield?

Mother: Yes, it does provide for equal education opportunity.

Observer: How do you know?

Mother: Because of the Head Start and this kindergarten. Do you know about the D.V.R. program [Division of Vocational Rehabilitation]? It really helped me years ago. A counselor got me into it. It's very important for the underprivileged and handicapped. Guess I'm sort of handicapped.

Observer: . . . everybody has strengths and weaknesses.

Mother: As far as learning goes, I am handicapped. Learning and knowledge have always been important, but I'm so slow.

Second Mother: [approaching, appears agitated, even hostile; later will have a serious clash with one of the kindergarten teachers]: There's not much school left.

Mother: Hello. Yes, time goes fast. [proudly] But Michael is going to be in Head Start. And so is his little sister. They're going to be smart. You know, I'm not very smart.

Second Mother: [with a trace of bitterness] Oh, I don't know. I've had two years of college. Now I'm here [divorced]; making $1.60 an hour, paying a babysitter 50¢ an hour--and for what?

There is a change in the public. It is a change in confidence in the schools to accomplish their responsibilities. People are less optimistic than they were fifteen years ago. Then, and for years earlier, no matter what the youngsters learned, they could go to work or on to further schooling. And now, and maybe for many years to come, no matter what the youngsters learn, they can go on to further schooling, but not to work. Perhaps it is easier to believe that what is wrong is the schools, rather than political-economic systems. Any grave challenge to the centrality of the schools in the American aspiration may be more a matter of loss of the American dream. So far at least, for all the wistfulness, there is not a substantial turning away from the schools as the instrument of learning and socialization.

DESTINY CONTROL

Perhaps no American institution has been more vulnerable to competing claims and shifting priorities than the public schools. Changing legal interpretations of "due process" and "equity," those Constitutional bulwarks, have had a direct impact on school policies and practices. The success of Russia's Sputnik just twenty-five years ago galvanized a concern for political-military strength. We reacted by overrunning the previous obstacles to federal intervention in education, passed the National Defense Education Act, and sought counseling and instruction for our future scientists and engineers.

And more. Contemporary obligations to acknowledge, even to honor, cultural and linguistic differences among people have seriously complicated the work of a school system built partly for the assimilation of disparate immigrants into a homogeneous society.* Racial desegregation and mainstreaming of handicapped children are among the more recent and continuing obligations of the schools to disregard and diminish the differences among people--to the end that we achieve a more equitable life in a more homogeneous society.**

From coast to coast there is widespread antipathy to "homogenization." Now, this could be taken as evidence that the cultural enclaves still successfully resist the melting pot idea of American destiny, evidence that the people of this country now have the more classical Western road of "upward mobility" via successful business or professional practice plus the more parochial road of social success according to the standards of the local community.

And there is such a continual restatement of instructional objectives and reorganization of school offices. Now this could be taken as evidence that the yearnings of dedicated individuals and pressure groups do redirect the work of the schools, that is, that the individual American is attaining a greater control over his destiny.

Most people we have talked with are not persuaded by such evidence. They see little increase in the leverage individuals have. The rhetoric of remediation of our problems, e.g., mainstreaming, should not be taken as evidence of remediation. Indeterminacy, e.g., organizational change, should not be taken as evidence of social sensitivity. The pressures continue. The buffeting of the school is real. But it is difficult to see the response as responsive to the troubles of modern life. The social standards set in the earliest colonial schools still predominate in today's schools.

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*An insightful document by a former U.S. Commissioner of Education on what the schools did to help "liberate" immigrants and minorities from their heritages was aptly entitled, "Cowboys, Indians, and American Education " by Harold Howe II, in Picking Up the Options (Washington, D.C.: Department of Elementary School Principals, 1968).

**Or perhaps, as Joel Spring claimed in The Sorting Machine: National Educational Policy Since 1945 (New York: David McKay Company, 1976), it was just part of the unrecognized National Educational Policy, to perpetuate the benefits of the meritorious and to quiet demands for correcting the inequities of the political-economic system.

While the rhetoric of national politics had been liberal and egalitarian in the past, it had been counteracted quite effectively by the conservatism of local practice. After World War II, the federal government became an increasingly important factor in local affairs as a result of the activities of the courts as well as the impact of such legislation as public housing or urban renewal programs. Unfortunately, the national government tended to implement its rhetoric with policies and funding whose effects were cosmetic rather than remedial--there is little sign of any genuine willingness to pay the costs involved in a serious attack on social problems, even if the competence to deal with them were present. Unimplemented changes in legal status can be had at little cost; the cost of implementation, as the busing controversy of the 1970's shows, can become an unmanageable burden. For the most part, efforts by the federal government to improve the lot of the poor and unfortunate were only tokens of intent and not serious efforts at remedy--an epidemic is not counteracted by immunizing and treating a small and select portion of the total population.

The author of these words, social scientist Eugene Meehan* faulted this nation for an inadequate effort. Was he wiser than an Oregon parent who said, "It doesn't pay to keep trying to do what you can't do."? The prevailing attitude in the schools today is to forget the idea of reshaping a national destiny through the schools, and to make things better here and there.

Why all this interest in destiny control? It is so much the myth of what the American schools are all about. Freedom from religious oppression. New lands. The Westward Movement. Horatio Alger. Jackie Robinson. We surprise the European visitor to our schools. Back home the schools are to perpetuate a system. Here too, but the talk, the talk is about the chances your grandfather never had, that a lad born in a log cabin who studied by candlelight could become President, that there is no subject matter any pupil cannot learn, given time and good teaching.

Others dream and say "Why?"
I dream and say "Why not?"

Mostly fantasy, Bobbie Kennedy, but part of the American dream--and still a useful dream, if homesteading, damming rivers, or teaching math are your business.

Plymouth Rock shone through the mists of James Coleman's study** of school segregation and its purported effects on children. Destiny control, the feeling that one has the power and the freedom to direct one's own life and manage the surrounding circumstances, was judged by Coleman to be a crucial variable separating the "successful" from the "unsuccessful" youngsters in the classroom. The plight of both parents and children in places

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*Eugene J. Meehan, Public Housing Policy: Convention Versus Reality (New Brunswick, N.J.: The Center for Urban Policy Research, Rutgers University, 1975), pp. 172-173.

**James Coleman, Ernest Q. Campbell, Carol J. Hobson, James McPartland, Alexander M. Mood, Frederic Weinfeld, and Robert L. York, Equality of Educational Opportunity, U. S. Department of Health, Education and Welfare, Office of Education, National Center for Educational Statistics (Washington, D. C.: U. S. Government Printing Office, 1966).

like our GREATER BOSTON site and our Alabama site are captured in these further words by Professor Meehan:*

> *Ironically and tragically, the factual helplessness of the inner city's population was increasing rapidly at the very moment when that population was being urged to entertain rising expectations about the quality of its own life and the life of its children.*

Expectations do continue to change. Conditions in some cities, it appears to some observers, are "bottoming out." In our middle Atlantic seaboard study, for example, we saw residents in the school neighborhood accepting more responsibility for improving their houses and landscapings. And the youngsters in those schools hearing over and over something like, "You don't have no rich uncle; you don't have no professional football career; if you gonna make it, it's gonna be by reading these books"--always with the tone that "yes, it is going to happen."

Powerlessness. Destiny control is a matter of concern for others than students, of course. The teachers are not optimistic about changing the system, but they have seen their salaries get better, and they think the unions can help some more. Though superintendents are facing a job longevity of but two to three years, they can count on "reorganization" to keep them from serious trouble for a year or two. They feel terribly constrained by state and federal demands and the unpredictables of community pressure.

Even school boards, the supposed ultimate power in the American educational system, are seeing themselves as having little control over the destiny of the schools. They once were the spokesmen for the teachers to the community, drawing more they thought in wages and privileges than the community was ready or even able to pay. Now teachers have formed collective organizations as a means of job protection as well as monetary advancement.

Boards considered themselves the patrons of the children, but students have brought pressures directly and indirectly to obtain wider choices of courses and various student rights. To the activist, parental involvement, special interest groups, basic civil rights, all are closely related to shaping one's own destiny, but to board members, this activism and the state and federal requirements are draining away the opportunity for the local community to have the schools it wants.

The State Board of Education in Pennsylvania saw fit to impose a Students Rights and Responsibilities Code on the state's 505 districts. District representatives protested--in a class action suit. The Court ruled that the Legislature "specifically gave local school boards the right to regulate student conduct and discipline" and cautioned the State Board that it could not assume it was a "super school board."**

And so at every level, even at the "super board level"--in spite of the obvious frequent changes in what the schools are doing--there is the feeling that you have less to say about it than you used to, that you don't have much to say about the destiny of the schools or their children.

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*Op. Cit., Meehan.

**The Scranton Times, February 25, 1977.

YOUTH AND ALTERNATIVES

If one is seeking a baseline for examining adolescence and the schools, nothing better is likely to show up than Paul Goodman's Growing Up Absurd: Problems of Youth in the Organized Society.* Unfortunately Goodman had relatively little to say about the education of girls--a matter obviously growing in importance. His insights concerning the loss of alternative ways for young men to establish a feeling of identity continue to be relevant. They have been supported by clinical studies. In a document prepared for the Mental Health Study Center, National Institute for Mental Health, Liebow wrote:**

> *The centrality of work, then, is not new to human experience, and it did not arrive with the appearance of capitalism and the Protestant ethic . . . What does seem to be relatively new, however, is the appearance of widespread, systematic nonwork--unemployment--as an integral part or by-product of the ordinary functioning of society.*
>
> . . .
>
> *Both the youth who has never worked but who sees [this] situation as his probable future, and the man who had experienced it retreat to the street corner where others like themselves, in self-defense, have constructed a world which gives them that minimum sense of belonging and being useful without which human life is perhaps impossible and which the larger society gives up so very grudgingly or not at all.*

Jerome Bruner*** also explored the realm of life prospects in a 1972 article partially focused on youth. He noted that adolescents were turning to a type of "deep play" such as "chicken," involving even an incomprehensively high risk of life.

What is characteristic of the whole, however, sometimes appears very rare in the parts. The CSSE case studies seldom use such dramatic tones in portraying the youth culture. More common are the colors of football warm-ups and pom-poms. More common are the squeaks and squeals of skylarking in the corridors. But even those distract eye and ear from the shades of gray of boredom, disinterest in student government, and disbelief in the stories of how it used to be or how it ought to be.

The kids still long to get on with life. Forty per cent of the black youngsters want work but cannot find it. Twenty per cent of the white. The desire for jobs is evident in the readings of URBANVILLE and RIVER ACRES. Commitment--even of teenagers--to an irretrievable way of life is evident in the farming community around BRT. The linkage between cars and jobs is all so apparent in WESTERN CITY.

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*Paul Goodman, Growing Up Absurd: Problems of Youth in the Organized Society (New York: Random House, 1967).

**Elliott Liebow, The Human Costs of Unemployment, ed. A. M. Okum (New York: W. W. Norton & Co., 1972), pp. 1-11.

***Jerome Bruner, "Nature and Uses of Immaturity," The American Psychologist 23 (August 1972) 704-705.

Automobiles continue to serve as the most obvious artifact of the youth culture. Vans, trucks, and Hondas assume increasing stature. Jobs are essential for maintaining access to wheels, for gasoline is 58.9¢ even at "the cut-rates." Jobs are essential for purchasing the accoutrements of regional good-life--ski equipment in greater Seattle, leather coats in GREATER BOSTON. Jobs are not apprenticeships; jobs are NOW.

More working, fewer jobs. It is no easier for a nineteen-year-old to get a job than a sixteen-year-old. The market is flat that way. Of course what looks like a good job to a sixteen-year-old boy or girl is not likely to look good enough to one three years older. The situation varies from place to place.

The schools are increasingly tolerant of youngsters working, and even make accommodations for late arrivals and early departures. In an urban New York City classroom every ten minutes or so a youngster slips in or a youngster walks quietly out, without challenge, legitimized at least in part by "the job." Even in the comfortable suburban school, over half of the high school youngsters have after-school work. That has an effect on extracurricular programs, to be sure, and is in turn an effect of fewer funds for special classes and extracurriculars. Boredom, cars, jobs, no money, no hobbies, no jobs--it's a complex pattern.

Only a few edges of the pattern seen in our sites show up as distressful as the conditions cited by Bruner, Liebow, and Goodman. Students acknowledge "a lack of motivation" for school work. Teachers recount the troubles of teaching lower-ability students. The folks in the RIVER ACRES schools deal at length with such matters. Similar concerns are found in all eleven sites. Particularly common is the loss of youth interest in following traditional pathways of academic progress.

Youth jobs bring immediate choices but not long-range choices. After working a year the sixteen-year-old does not get promoted to a seventeen-year-old's job. It doesn't work that way. He or she quits. Maybe because the job no longer is good enough. Maybe because it's just no longer necessary or fun to work. It's not clear. What is clear is that nobody is offering career work to teenagers. According to economist Eli Ginzberg* only three out of ten new jobs now being created are "good jobs." McDonald's has its famous Hamburger U. for the training of McDonald management people--but it takes about as many recruits as the National Football League. So young people pass into their twenties with both an education and an appetite for spending money greatly exceeding the long-term work opportunities available to them. Seven years later, about at age twenty-five, they finally get into long-term work. Nobody seems to know why it takes so long.

Already, in a sense, "overeducated," the two main answers to the high school graduates' question "Now what?" are: more education or hanging around. The influence of "overeducation," the prolongation of formal schooling prior to entering the work force, appears to be one of the chief undercurrents in the troubled waters of public education. Its relationship to structural changes in world economies was featured in the May 23, 1977 edition of Newsweek. Noting similar conditions throughout western Europe, the authors compared them to the state of affairs in this country:

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*"The Purpose of an Economy," Jobs for Americans, ed. Eli Ginzberg (Englewood Cliffs, N.J.: Prentice-Hall, 1976), pp. 1-7.

> *The youth-unemployment disease that has plagued the United States since the early 1960s has crossed the Atlantic. More than 2 million people under 25 may be out of work in the nine Common Market countries, and at the economic summit in London this month, youth unemployment emerged as one of the West's thorniest issues. The danger is that disillusioned and sidelined youths may take a sharp political turn to the left. "We just can't afford to have young people out on the street at the mercy of radical ratcatchers," says West German Chancellor Helmut Schmidt.**

The Chancellor's strong words are a reminder that traditional long-range goals also appear to be losing their hold, not only on youth but on other segments of society.

The youngsters are in trouble because they are idle, they are idle because they do not work; they do not work because they are ignorant and lazy; they are ignorant and lazy because the schools have failed to do their job. So goes a common line of reasoning. No doubt there is some truth in it, but not much. Most youngsters want very much to work. Most have strong preferences as to the kinds of work that are worth doing. And they have energies that compare well with other segments of the population. There are political complications here.

Brendan Sexton,** formerly director of the Center for Leadership Training, United Automobile Workers, has warned that the educator who is concerned with talent development, but who at the same time divorces himself from the political problems of the economy is "fooling himself and misleading the people he seeks to educate and train." The implications for both schools and the social order may have been stated by Robert Merton several years ago.***

> *In the American Dream there is no final stopping point. . . . At each income level . . . Americans want just about 25 per cent more. . . . (but of course this "just a bit more" continues to operate once it is obtained). . . . The family, the school, and the workplace--the major agencies shaping the personality structure and goal formation of Americans--join to provide the intensive disciplining required if an individual is to retain intact a goal that remains elusively beyond reach.*

This striving, competitive, materialistic side of the American dream, whether the working of avarice or fulfillment, cannot help but confine youth. Not in wants, they want the diversities of the universe--but confined in opportunity to pursue those wants. It is a time of job shortages, a time when initial capital needed for franchise or farm is enormous, a time when family control, "old boy networks" and union quotas, choose, legitimate, and limit who will get the good jobs, the tenure tracks, the career opportunities. These are not inventions of the 1970's, of course, but they are the realities of the youth-opportunity world this decade.

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*David Pauly, "Europe: Idle Youth," Newsweek, 23 May 1977, p. 53.

**Brendan Sexton, "Opening Up the Options," (Address prepared for Symposium on Talent Development, University of Illinois, May 1970), mimeo.

***Robert K. Merton, Social Theory and Social Structure (New York: McGraw-Hill, 1962), pp. 136-137.

Advertising has urged us to excess. Art and literature have revered individuality and downplayed modesty. The Women's Movement has prompted women to work, and for all its justification, has put wives in competition with youngsters for work. Privilege in the society has become increasingly related to the expense account, so becoming corporately salaried has become among the holies of our time. In seeking more we are saying to the twenty-year-old as well as the sixteen-year-old: your time will come later.

The society is liberated, freer, less constrained. The alternatives for youth, in terms of expression, are many. The alternatives for youth, in terms of career choices, are much more constrained. How much so is not well known--how much the schools contribute, if any, to the broadening or narrowing of life opportunities is not readily apparent.

Increasingly, schools have been offering alternative curricular programs. For many years a student could take a more college-preparatory or more vocationally-related sequence of courses. Special tracks have been available for children with learning disabilities and physical defects. Electives have made the school course-catalogue appear to be nicely diversified.

Individualized schooling. Teachers once championed the idea of taking a child where he/she is and helping him/her along his or her own developmental, experiential path. You do not hear much of that talk today. Most counselors and teachers impress upon you the importance of meeting minimum requirements and common terminal objectives. There is "individualized" instruction in many schools but it means proceeding to a common goal at your own pace, with relatively little contact with teachers or other learners. With everyone on the same track there are few choices for youngsters to make other than whether or not to try.

Interest in "career education" is on a five-year high throughout the country despite the evidence that it has no standard interpretation. The flowering of community colleges, with their two-year terminal programs and ease of access, contributes to preparation of youth for jobs, but they still offer "school," not "work," and the assurance of employment in most fields is not high.

As youngsters became increasingly disillusioned with the war in Vietnam and other aspects of our culture, both sacred and folly, they dropped out of school. And schools, usually at the initiative of disillusioned young faculty members, created store-front academies and alternative schools to lure them back and to keep others from dropping out.

The school's offering of alternatives is usually, perhaps as it should be, to satisfy parent concerns more than student. The description of the alternative school in ALTE is an interesting case in point (p 3:101). Some of the more recent alternative schools concentrate on teaching the basic skills and traditional values. Private and parochial schools continue to offer parents many alternatives, but most are not real alternatives for the young. An effort to diversify alternatives was tried in the "Voucher-Plan" experiments, but even if they had struck a popular chord, they would have been for parents more than youth. Perhaps that is as it should be.

Research on learning styles and aptitude-treatment interaction* has not shown a way for the schools to contribute more to the diverse individualities of youngsters. The school's role is an uncertain one. Youngsters do not seem to feel that the schools have too limited a selection, or that they limit their later selections, but we do not really know.

We know too little. The problems are too large. Too much is expected of the schools. The pressures are too many. It is a gray background against which we examine eleven school science programs.

Readers will find one special theme running throughout our eleven case studies and this entire report. It is nicely described by the words of Martin Trow,** reporting on a discussion among sociologists as to what their discipline might offer to the (then) newly-created National Institute of Education:

> *One theme that underlay much of our discussions was the tension between the broad currents of populism in the society, which we seem to agree are growing in strength, and the importance of the training and formation of elite groups, and the conditions for elite achievement. I think it is perhaps the central tension in American society, and naturally shows itself very clearly in many educational institutions.*

Our case studies captured both the positive and negative effects of this tension. The picture we obtained from any one site, from all together, is fractured, incomplete, sometimes contradictory--as is all human drama. There are moments of truth, moments of vision. There are illustrations in the following pages of administrators, students and especially teachers, hanging on, fashioning creative responses to complex and distressing situations--of course some of their own making. In most places we visited, we found the will to prevail. And new ideas. It was Thomas Jefferson whose philosophical and political battles with Hamilton formally launched the struggle outlined by Trow and who first reminded us that "where there is no vision, the people perish."

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*Lee J. Cronbach and Richard E. Snow, Aptitudes and Instructional Methods: A Handbook for Research on Interactions (New York: Irvington, 1977).

**In a letter to Professor Burton R. Clark, Yale University, August 3, 1971, p. 5.

THE NATIONAL SCIENCE FOUNDATION*

The National Science Foundation was created nearly thirty years ago as an all-purpose science organization of the United States government. Almost from its start, NSF has adopted a position that, as the government science organization, it should be concerned and involved with science education in the country. This involvement has focused more on quality than quantity in the sense that the emphasis has been on improving the quality of science education rather than on increasing the number of persons who pursue scientific careers. The program to effect improvement in science education has had two general related thrusts: curriculum development and teacher education.

Most people asked to date the start of NSF involvement with science education would probably respond that it started with Sputnik I (1957) when the launching of the first Soviet satellite emphasized the tremendous progress of the U.S.S.R. in science and technology. While Sputnik I confirmed the Russian capabilities, they had been recognized earlier by NSF, and the program to improve science education was started before the appearance of Sputnik I.

The first teacher education efforts were in 1953 when two summer institutes were conducted. One was for college teachers of physics and the other for college teachers of mathematics. The first institute for secondary science teachers was held in 1954. The teachers education program grew quickly and in the peak year of 1968 over forty million dollars was spent on education for over 40,000 teachers most of whom were secondary teachers. The teacher education program has been reduced since 1968 and in 1975 about ten million dollars was expended for various kinds of teacher training activities.

Much of the teacher education activity was done in support of the other programmatic emphasis, curriculum development which is known formally as Course Content Improvement. Support for curriculum development started in 1956 for the project to prepare new high school physics materials. The support was to a group called the Physical Science Study

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*The content of this section is based for the most part on the following sources:

Milton Lomask, A Minor Miracle: An Informal History of the National Science Foundation (Washington, D.C.: National Science Foundation, 1976).

Dorothy Nelkin, "The Science-Textbook Controversies," Scientific American 234 (April 1976): 33-39.

Suzanne Kay Quick, "Secondary Impacts of the Curriculum Reform Movement: a Longitudinal Study of the Incorporation of Innovations of the Curriculum Reform Movement Into Commercially Developed Curriculum Programs," (Ph.D. diss., Stanford University, 1977).

John Walsh, "NSF Education: Basic Issues Still Unresolved." Science, 15 July 1977, pp. 233-236.

The reader with a strong interest in the history, controversies, and impact of the science education efforts of NSF is referred to these sources.

Committee and the project has become well known as PSSC. Over thirty Course Content Improvement projects have been funded since that time. Among the more well known are Biological Sciences Curriculum Study (BSCS), Chemical Bond Approach (CBA), School Mathematics Study Group (SMSG), and Man a Course of Study (MACOS). Funding for curriculum work reached its peak at about twenty million dollars in 1968 and has declined to about six million dollars in 1975.

Regardless of relative costs the science education program of NSF has been large enough that it should have had a major impact on science education in the country. Indeed the evidence supports the expectation. The Quick study documents considerable evidence of curricular, course, teacher, and student impact consistent with the goals of NSF.

The kinds of impact, however, are not equally valued by all. Consequently a considerable amount of controversy has been stimulated by the program, especially the Course Content Improvement aspect. Some of the controversy arise from imagined impacts, but that does not mitigate the concern.

There are three general themes in the controversies. One theme reflects a concern about Federal control of the schools through imposition of a nationwide standard curriculum. NSF has been exceedingly sensitive to this issue and has done many things to insure that they do not become directive. The evidence thus far is that this issue represents an imagined impact. Quick argued in her study that the science curriculum was more unified or common across the nation's schools prior to NSF than it is now. She suggested that the increased amount of variation is attributable at least in part to the curriculum work of NSF.

A second theme is that the content of the course has been changed so that the course does not teach the important content. This issue has been especially noticeable with the mathematics curriculum and the controversy about the "new math."

The third theme indicates a basic difference in values or beliefs among sectors of society. BSCS and MACOS materials have been severely criticized by some because they either fail to recognize alternative explanations or present explanations that are regarded as subversive to the "truth."

The political pressures on NSF from these controversies have become strong and have forced the Foundation to become extra careful in its science education efforts. It appears to some that NSF is being forced to withdraw from the leadership role that it has held and to assume a responsive role. Efforts in science education must now be justified on the basis of a needs assessment study. One might speculate that the justification will be best received if the needs are those expressed by a politically viable group.

Three needs assessment type studies were initiated by NSF in 1976. The results from the three studies will be used to make and support policy and program decisions for the science education program. This report is of the findings and recommendations from one of the studies, Case Studies in Science Education.

CHAPTER C

RESEARCH METHODS USED

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Chapter C

RESEARCH METHODS USED

Jo Ann Day and Robert Stake

Project Framework

In this chapter we describe the research methods used to obtain and present multiple case studies in science education to the National Science Foundation (NSF). Our study was one of three* funded by the NSF to assess national needs identified in a Request for Proposals (RFP), dated September 16, 1975. Our field work was carried out in three phases between September 1976 and November 1977. The three phases of the project consisted of case studies observations, site visits, and a national survey. While these activities are listed in order, they were planned and executed in three overlapping phases, approximately:

Case Studies	September 1976 - May 1977
Site Visits	November 1976 - May 1977
Survey Operations	August 1977 - November 1977

AIMS OF THE PROJECT

The major purpose of this study was to describe the status of pre-college science education in the United States in the 1976-77 school year. Issues and existing practices and outcomes were found, explored and described by researchers with the intent of providing another link between two camps--the camp of school people in each local community and the camp of national education policy makers. It was recognized that each camp had its own perceptions of what is needed and desired within a nation's school districts, and what is needed and desired for a nation's school system. The camps overlap, yet remain distinct. The case study descriptions were expected to be useful first in Washington, but later around the country as well, as people of all kinds struggle to meet the needs of a nation for science education of high quality.

CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

Seeing rather than measuring was the activity of this project. "Issues" were central foci, guiding the seeing, organizing the understanding. We sought vignettes and devised scenarios, representations of experience, to illustrate the issues. What principally we hoped to see was "how much science is being taught (and) the obstacles to good science teaching." (proposal)

During the contract period we prepared statements, i.e., extended memos, to guide the project staff and others as to conceptualization and operation. Some of these statements will be included here, as is Number 20 on the next page.

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*The other two were reported as: Iris R. Weiss, Report of the 1977 National Survey of Science, Mathematics, and Social Studies Education (Research Triangle Park, North Carolina: Center for Educational Research and Evaluation, 1978); and Stanley L. Helgeson, et.al., Status of Pre-College Science, Mathematics, and Social Science Education 1955-1975, 3 vols. (Ohio State University: Center for Science and Mathematics Education, 1977).

CSSE STATEMENT NO. 20
ON SEEING AND MEASURING

September 12, 1976

It is natural to see. It is natural to measure. Seeing and measuring are not the same act.

But they are even more difficult than we suppose. The common notion is that when one measures one sees the same thing but sees its amounts. As if one were seeing through glasses having graduated-scale markings on them. Measurement glasses, however, do much more than scale the view. Much more difference there is between seeing and measuring.

There is a transformation from experiential perception to representational perception. The observer switches from actor to director. He/she gives up the direct impression of the thing, perceiving it no longer as another being, a whole object, a member of the physical populace, and perceives it then as a bearer of properties, or even merely as an array of characteristics. This is no small transformation.

When I find myself in the company of a rose I see <u>it</u>. I do not see its redness, nor the Washington Monument its tallness, nor Professor Bronowski his intelligence. In order to talk about them--and perhaps even to think about them--I am always putting on the measurement glasses, and of course I see then, at least partly, each as a collection of properties: its brilliance, its tallness, its redness.

Getting ready to measure may be more like changing mindsets than putting on glasses. Taking vitamins, going on a diet, downing a martini, or submitting to sodium pentathol may be more the analogue. They change mindset, changing one's ability to respond, changing one's experience itself. Now one fits into different clothes, into different roles, into different valuings. And these changes bring changes in strength and power.

The way most of my researching colleagues want to see the world is through the properties of things. The way most of my teaching colleagues want to see it is to see things as things.

Putting on glasses that focus on properties, scales, and amounts changes the perception. Perhaps only a little, as sunglasses do; perhaps a lot, as reversal prisms do. Whether the distortion is slight or great, whether the change results in more or less comprehensibility, the impression gained is different from that for the unaided eye.

I do not know whether the unaided eye is <u>more</u> or <u>less</u> likely to see the truth. But it is important for me to realize that the perception of things with an orientation to properties, with an orientation to measurement, is "corrected" vision. Measurement is common and natural, but it is "corrected" vision.

Whether or not such vision moves us closer to truth is a matter to worry about. Many of us have not been worrying because we have been taught that when we measure we are closer to truth than when we just see.

The difference between seeing and measuring seems small when Experience is the heat of the day and Measurement is the column of mercury in a thermometer. It is because of the commonness of looking at the thermometer, or hearing its amounts, and realizing the correspondence to our feeling.

For most of our measurements in education we do not have such a correspondence.

Measurement is not just holding a ruler to what we see, but seeing something to hold a ruler to.

Issues. Seeing something to hold a ruler to was not our aim. This research project was experience-oriented. We relied heavily on intensive field observations and interviews as a means of recording differing images and meanings. Issue-based images and meanings--more than properties and measurements--were to form the conceptual structure for the work.

In CSSE Statement Number 21 we defined an issue (for our purposes) in the following manner:

> An issue is a circumstance about which people disagree. It usually involves a condition having some features causing (or believed to cause) certain effects. These effects are valued differently by different people--so they disagree as to whether and how the condition should be changed.
>
> The ingredients for an issue then are the condition, the effects, the relationships between condition and effect, the different valuing, and the alternatives among courses-of-action for changing conditions.
>
> (It is true that the contention might be due more to disagreement as to whether or not a relationship holds than to different valuing of the effects. Either way, issues are points of contention.)

The issue list was one conceptual structure for observations throughout the project. To be sure it was an evolving list, one that was expected to be modified and changed by involvement in the sites. The issues were originally conceived of as "foreshadowed problems:"

> *Was it Benedict or Malinowski who spoke of "foreshadowing problems?" One, perhaps both, and more recently, Lou Smith, urged the field observer to specify the big questions that take him/her into the field. Such questions are the basis for deciding what will be observed.*
>
> *Foreshadowing problems are not "the hypotheses to be tested." They are not that durable. Though apparently the most important questions at the outset, they are expected to give way to still more important questions. The issues that dominate the final report may be reformulations of the original issues or may be some that emerge during the investigation. The investigator needs to avoid overhonoring and overkeeping the chosen foreshadowing problems, but also to avoid approaching the scene with too little an idea as to what to watch and what to record.* *

At the outset of the CSSE project it seemed there were three large foreshadowing problems:

> How is science being taught today?
>
> What are the current conceptualizations of science in the classroom?
>
> What are the current encroachments upon the science curriculum?

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*Robert E. Stake, "Seeking Sweet Water: Case Study Methods in Educational Research" (Urbana, Ill.: Center for Instructional Research and Curriculum Evaluation, AERA Training Tape Cassette, forthcoming).

The foreshadowed problems constituted the starter list of issues. The list soon changed and continued to change over the course of the study. We expected that local issues would emerge as observers attended to such concerns as the following:*

Different Conceptualizations of Science
- Science as inquiry
- Science as explanation
- Science vs technology
- Social science vs social studies

Perception of Conflict Between Science and Culture
- Science and Religion
- Social science and cultural taboos
- Moral issues and science teaching

Place of Science in the Curriculum
- Core subjects and electives
- Preparation for college
- Vocational relevance of science
- Integration of subjects

Science Instruction
- Appropriateness of teacher preparation
- Organization for teaching, class periods
- Testing, assessment, teaching for the test
- Laboratories, materials, projects
- Science clubs, competition, honors
- "Driving-force" persons, "Mr. Science"
- Changing roles for teachers

Changes in School or Community that may affect the science (including math and social sciences) curricula
- Diminishing budgets for education
- Emphasis on the basic skills
- Emphasis on bilingual programs
- Adversarial roles of teachers and administrators
- Increasing role of parents and citizens
- Desegregation actions

Some issues were found in the news media: back to the basics, declining enrollments, fiscal problems and conception of science education as vocational and environmental education.

It had been anticipated that five or six major themes would emerge as the most important issues across the sites. Possibly they would be some identified in the professional literature. However, before the end of the project, the five major clusters of issues listed above had developed into many clusters, with sub-issues and new collections of sub-issues to form new clusters. We had expected to organize the final report assimilation chapters around the predominant issues, but our authors found such an organization too indifferent to many important observations--so we shifted to a more taxonomic table of contents.

Seventeen substantive questions were raised in the RFP to guide case study observation and analysis in this project. Direct responses to these questions appear beginning on page 19:16. Data for those answers are inherent in the quotations and descriptions of each case study. The questions direct one's attention to the general roles and practices of today's science educator. These roles and practices are essential background circumstances for understanding the issues we found at the sites and in survey returns from around the country.

Vignettes and Scenarios. The commitment "to see" more than "to measure" invited the use of vignettes and scenarios. These distinctions were made for our purposes:**

> A vignette is a small illustration or perhaps one facet of an issue, only suggestive, but poignant. It will often be a wisp of a dialogue but sometimes grows beyond the size of anecdote to become a short story. It may be the trace of previous action, such as the smudge of lip prints on a photograph. Momentarily it is "figure," but shades off into the larger meaning of the issue. In this study we will label something a vignette only if it is reported as an actuality.

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*CSSE Statement No. 2.

**CSSE Statement No. 21.

A scenario, on the other hand, for us, is a contrived illustration of one or more issues, its parts joined together not only to indicate conditions and to suggest courses-of-action, but to provide a stimulation to discussion and description of personal points of view. The scenario may include vignettes or be reconstructed from them. Questions, sometimes calling for categorical answers but usually calling for explanation or narration, will be a part of the scenario.

An example of these differences can be seen in the following statements as it relates to a particular issue.*

Issue: Molecularization of the curriculum, breaking down the course content to small pieces of knowledge and skill; to facilitate teaching, learning, and retention; possibly resulting in a narrowing of the subject matter, diminishing differences between learner scoring on tests; perhaps requiring new orientation and skills of the teacher; perhaps enabling administrators to state school aim and accomplishment more accurately, to be accountable; possibly consistent with desires to return "to the basics" and to teach responsibility and respect.

Vignette: One frustrated sixth grader in District Alpha, whose teacher was very proud of the rapid progress he was making in the individualized math program, was asked,

"What kinds of answers do you want to put down?" "Any," he replied, "as long as they agree with the key. You see," he said, "it doesn't matter if you are right or wrong, it's according to whether it's what the key says. If you put down 2/4 and the key says 1/2, you get marked wrong even if they are the same thing. If the answer really was 1 and the key had 2, you'll get marked wrong, if you put down the right answer." "How do you work so fast, then," he was asked. "I just try doing each page quickly using one way. If I get them all marked wrong, I try another pattern. Sooner or later, I find the right pattern and get the whole page right." "Don't you then try to use that pattern again?" "No! Each page is different."

Scenario: Excerpt from Scenario D. The superintendent of the Dorchester Schools is telling everyone about the new objectives-based curriculum in the local schools. Each teacher has identified the basic goals of each course--the knowledge and skills each collected and bound in a bright orange-and-black notebook, one copy of which has a prominent place on the table each evening the school board meets. Is this the way it is in your school? Is there any danger in breaking things too small?

Vignettes are found throughout the case studies and site visit reports. The CSSE personnel used vignettes from their own experiences on site team visits as well as vignettes from other reports to discuss the issues.

Our final choice of scenarios is found with the survey findings (Chapter 18) and within the assimilation chapters (12-17). Scenarios as contrived illustrations were constructed originally from foreshadowed problems and vignettes found in our field observations. In the process of developing the scenarios they were presented to respondents at all case study and trial sites** in the form of issue-scenarios.

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*CSSE Statement No. 21, vignette adopted from Stanley Erlwanger, "Case Studies of Children's Conceptions of Mathematics," (Ph.D. diss., University of Illinois, 1974).

**Our planning included the use of trial sites. These sites (both rural and urban) were used to provide information for and reactions to our scenarios, plans for site visits and survey questions.

These scenarios were meant to reflect more than immediate problems to a local district, yet to retain a sense of immediacy to local teaching and learning in a way most research hypotheses do not. They were neither highly general nor highly localized questions.

The site visit team* originally spent a major portion of its onsite time pursuing these issues via the technique of an issue scenario. A typical session included a small group of people--site visitors and respondents. A scenario was presented to this group to find out what kinds of teaching and learning were occurring, how science was conceptualized by teachers and students and how various things happening in the community and school were affecting the science, math, and social studies curricula.

Teachers, administrators, students and residents of the community were asked to respond by drawing upon their experience in reaction to the scenario presented. Conceptualizations of issues were to be those held by these groups. The intent of the development of issues into scenarios was that they would be used in the national survey. Survey questions were designed around a particular scenario to confirm or disconfirm the importance of the issues nationally.

During preparation of the scenarios, we took them to the field and raised several questions of teachers and others. We asked questions about each scenario to ascertain:**

1. the typicality of the situation depicted
2. the accuracy of the representation in the scenario
3. the importance of the issues
4. suggestions for remedy of the problems at issue
5. other important issues we should be raising

After further refinement based on the responses, the scenario format was set up for inclusion in our mail survey. The eight that continued to be seen as vital at the case study sites were to be included. Categorical responses were added for survey use, though many open-ended questions were retained. This is described further in Chapter 18.

As the months passed, the scenarios became less used at the sites. They served nicely as "ice-breakers" for discussion, but school people often felt the scenarios were unsatisfactory representations of conditions at their site, sometimes even because (it appeared) only one part of the scenario did not correspond. But also, the scenarios presented so complex a picture that on-site respondents concentrated on detail when we wanted to talk about major movements. It was seldom that the issue of the scenario was considered unimportant, unrecognized, or inapplicable, but it was too seldom couched in the appropriate context for them. The discussion often would continue with the issue presented by the respondents in a context more fitting to their situation. As a representation for conditions broadly, the scenarios became less and less useful.

The conceptualization of the issues of science teaching continued to be incident-oriented rather than property-oriented until the end of the field work. The scenarios were used in the survey, but the case study writers found the effectiveness of their descriptions depending on details and circumstances idiosyncratic to a site, even though the issues themselves appeared to be quite general.

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*Carrying out the second phase of the project. See p. C:38 for the site visit calendar. By the sixth site visit, eight issues had been selected for survey questionnaire use. Site visit interviewees continued, of course, to be asked about a broad range of issues.

**CSSE Statement No. 22.

TWO ORIENTATIONS FOR STUDYING EDUCATION

We aimed to identify and understand major issues as they were perceived in the field by teachers, administrators, students, parents, and curriculum supervisors. Their perceptions were sought and recorded by intensive unstructured interviews as well as by structured questionnaires. Their teaching and learning situations were observed formally and informally. Data were gathered, analyzed and reported in a combination of two methodological orientations: naturalistic and formalistic.

We used both orientations, but the naturalistic orientation more. It might also be said that we were more qualitative than quantitative, more issued-based than property-based, more case-particularistic than population generalizing, more subjective than objective, more experiential than rationalistic, more empirical than idealistic, and more hermeneutic than positivistic. But in each instance, of course, we were some of both.

Natural Orientation. We tried to see and to record the educational phenomena as others were seeing them. We tried not to impose special constructs to represent typical situations or underlying bases of covariation. Of course we brought along our theories, our memories, our tabulations of history, and our "etic" issues--and to a certain extent those formalisms influenced what we viewed.

We were looking for what was particular to individual persons, or to individual classrooms, in individual sites. If it existed, we sought a community view, or all-school view, but we tried to make sure that we understood any of the views more particularized than that.

> It is implied by the "definition of the situation" that there is no one-to-one correspondence between an objectively real world and people's perspectives of that world, that instead something intervenes when events and persons come together, an intervention that makes possible the variety of interpretation which Schutz calls "multiple realities." According to this view, the same events or objects can have different meanings for different people.*

These differing views, these multiple realities, were apparent in each of the case studies and site visitor reports. They were apparent in the responses to survey questions as well, but there, both questions and answers were predominantly formalistic. Still, answers to the open ended questions came back oriented to the concrete particulars of experience: the persons, places, events, and things the respondents knew.

Formalistic Orientation. In educational research the most common way of describing complex things is to analyze them into their constituent parts and to summarize quantitatively the properties or variables common across a sample of these things. Understanding of particulars is expected to come by reference to populations which in turn are understood inferentially by a study of sampled cases. In order to make these inductive and deductive leaps, certain properties are identified as of particular relevance. The property is measured for each case. Inferential statistics are used as the basis for understanding the "general" situation. The description of complex things necessarily is limited to those things that can be expressed in terms of relationships among properties.

To describe one aspect of science teaching we might have identified the teacher and the textbook as two important parts. A property of classroom recitation might have been the frequency of teacher requests that a question be answered by reading it directly from the text. The actual frequency of this occurance would have been small, but it did turn out to be much larger than our expectation. Had we anticipated it and made such a count, we would have had a formalistic way of presenting that one issue. As it was, toward the

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*Peter McHugh, Defining the Situation, (New York: Bobbs-Merrill Co., 1968) p. 9.

end of our fieldwork we realized that such questioning was more common than we expected, and noted our common recollections across field sites. As it happened, then, it was a naturalistic rather than formalistic finding, though it could have been either.

In CSSE we supported our naturalistic inquiries by collecting some standardized data and by classifying typical situations. We expected to do more than we did. We ended up without the quantitative summaries of the properties of science instruction that other proposers answering the RFP would have featured. What we did was to use the naturalistic orientation to identify the issues of teaching and learning, then to use the more formalistic questionnaire to get additional information. Thus we have many statements about the frequency of viewpoints, and relatively few enumerations of actual events.*

Upon receipt of first drafts of case studies, we debriefed ourselves in a naturalistic way, trying to exercise the discipline of the historian, ethnographer, and archeologist, searching for confirmation and disconfirmation in the experience we had encountered, and preparing a report based on generalizations drawn as much from recollection and intuition as from the formal records we kept.

CONSTRAINTS

Some of the framework for this study was set by the constraints of contract research in a real world situation. As indicated before, the National Science Foundation imposed certain requirements, such as the number of sites and representativeness of the sites. The schools, the research community, the calendar and our budget imposed certain other constraints.

The constraints that we were working under are discussed throughout this chapter as a part of the methodological context. We have presented them both as specific to each part of our methods sections and indicated how they shaped or changed our research design. The constraints are not unknown to many other researchers and are not mutually exclusive of each other. Time, budget and the state of social science methodology in general and a multiple case study project in particular are discussed.

The greatest constraint was time. We had a long eighteen months to do the work, to get answers needed much sooner, but still we had too little time. We did not have time to integrate into our thinking hundreds of suggestions, writings and research results that we came upon. The administrative burden took more time than it should have. We needed more time to write up the case studies and to assimilate the findings. Perhaps we should have confined our field observations to a single semester--but then we might have missed the reality of year-based schooling and we would not have had Lou Smith, Jacquie Hill-Burnett, Rudy Serrano, Dan Stufflebeam and Jim Sanders working on the project. The CEIS and OMB clearance procedures and NSF final review took too much time, even though those people were extremely cooperative--and our own clearance procedure for maintaining anonymity took too long, even though we ran into no problems. If we had had more time, we probably still would have wanted more time.

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*We were aware that some readers will dismiss as invalid any summary that is not based on objective measurement and impersonal analysis. The validation of our assimilation findings does not depend primarily on formalistic analysis. Within our case study chapters we present innumerable confirmatory items and the most contrary evidence we could find. Our methods are not immediately replicable in the sense that our fieldwork has been explicated so that another researcher could take exactly the same steps. But the study is eminently replicable in that our constructs are common and public, not steeped in special abstract or technical meaning. They are open to verification or repudiation by anyone. Other data such as ours are accessible. If we have failed to recognize a mass of disconfirming evidence, we are confident that our professional colleagues and others will bring it to attention--instance by instance perhaps--to discredit or qualify our findings.

As with any study, and even with a generous funding here, money was a constraint. The original budget was for $256,000 for an eighteen-month period. To add the Columbus site we were awarded an additional $26,000 and to improve the survey operations we obtained $10,000 and two months more study time. A rough breakdown of institutional allocations showed:

	Proposed	Actual
Professional salaries	$103,000	$132,000
Travel, lodging	52,000	41,000
Office, computer, printing	44,000	49,000
Indirect costs	57,000	72,000
Total	$256,000	$294,000

A more functional breakdown of actual expenses was estimated to be:

Field observations	$130,000
Site visits, coordination	40,000
Survey	30,000
Project administration	22,000
Indirect costs	72,000
	$294,000

Although more volunteer labor became available than expected, allocations of funds and other resources were essentially as planned.

Had more money been available we would have been able to pay observers for analysis and writing time and for additional time on site. Additional funding would probably not have availed us a more competent staff, nor inclined our observers more to the standardized techniques some critics wanted. In retrospect we realize we should have increased the size of our survey respondent groups (rather than going for additional groups, as we did) and we might have done that better had we had more money.

At the outset it was apparent that there are but few researchers experienced in field observation in schools, particularly regarding pedagogical and curricular issues. This was a constraint, but we accommodated the design to it, and got such people assigned to almost all our sites. We could have been disrupted by weather, or by dissension at headquarters, or by withdrawal of school cooperation, but we were not. The only constraint we were continually sensitive to was time.

Phases of the Project

CASE STUDIES

We undertook these case studies to provide an empathetic view of science education in a small number of schools--a view especially seen by the persons who spend their time there. If for example, the work is sometimes seen to be more difficult or less difficult because of what "outsiders" do (outsiders such as citizens, university projects, government agencies) we wanted to document that. The final portrayal was not expected to be what is typical for the country, but a guide to issues that are widespread. Readers may see their local situation in a new light, policy setters may see new implications of their policies, as they read these case studies.

Site Selection. Ten sites were selected at which to do Case Studies in Science Education. An eleventh site was added when NSF personnel became interested in an opportunity to study science education within a context of crisis, a heating fuel shortage during late winter, 1977.* We wanted to select a manageable group of cases that would illustrate the diversity of the total group, yet show the need to examine the complex nature of science education in each site.

Five sites were chosen within driving distance of where prospective field observers were doing other work. (We believed that qualified field observers are rare and difficult to hire: getting experienced educational field researchers to do the case studies was of high importance to us.) Within this driving range, the five school clusters, and the other five school clusters nationally, were chosen to give us a balance in geographic location, type of community (urban, suburban, middle-sized city, or rural community), curricular orientation (innovative, traditional) and reputation of the science curriculum.

The RFP had called for a well conceived sampling plan. Many proposers and reviewers interpreted this to require a stratified random sample. We would have preferred randomized selection if it would somehow allow us the balance just mentioned and an effective observer corps. There was no way of identifying the above characteristics for all schools in the population. We could have drawn a sample, stratified for geography and type of community, then checked out each new selection to see if it fit our definition of balance, replacing selections until the balance was attained. Even so, this sample would have caused us to lose four or five of our best field observers. We had to choose between a more robust site sample or a more robust team of observers. We chose the latter.

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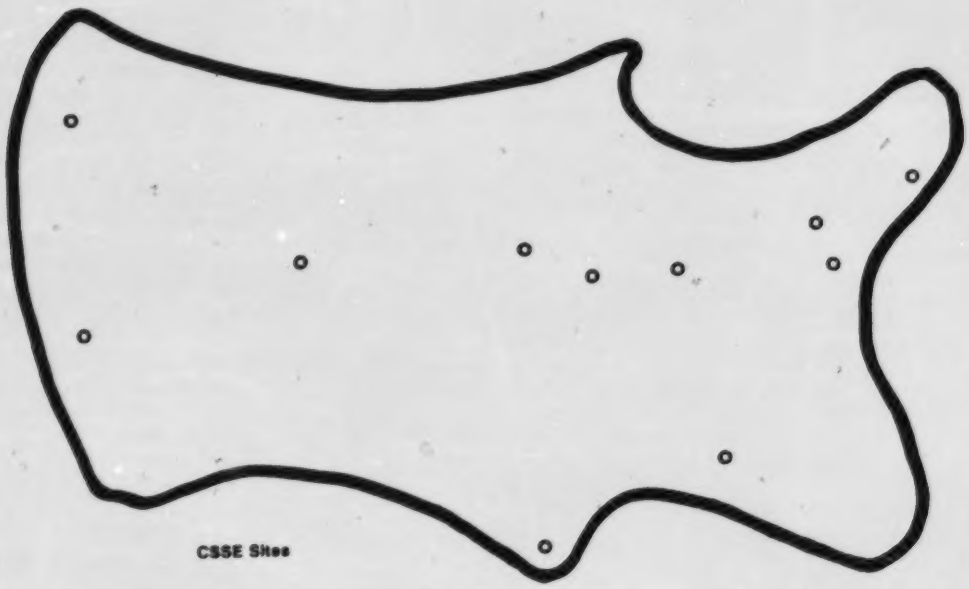
*Methodology of Case Study in Columbus. The case study authored by Jim Sanders and Dan Stufflebeam was researched independently. It represented an opportunity to study science education within a context of crisis--a school district crisis recognized by community and nation. Intensive efforts were made to gather appropriate information utilizing the following: observations; interviews; newspaper, Nielsen, and Arbitron surveys; television ratings; random sampling of groups of teachers, students, and parents; and hearings with teachers who taught over television.

The data collection took place during February 1977, when the schools were closed and "School Without Schools" was conducted. The observations, interviews and surveys were continued for a week after the school reopened March 7, 1977. Familiarity with the site was a factor for Stufflebeam who once directed The Evaluation Center at the Ohio State University and continued to have ties with the Columbus public school system. Unlike our other sites this one could not be granted anonymity in our reports because of the uniqueness and publicity of the emergency effort.

Access to the sites was an important consideration in site selection, but we did not turn down any possibility because access appeared difficult or unattractive. Only one potential site (Grand Rapids, Michigan) refused our request. In retrospect, we realized we might have biased the sample somewhat by thinking of (and later selecting), for a rural community in the South, a district whose superintendent we already knew. In some districts having multiple schools we saw that district officials were steering us toward or away from a particular school. Sometimes they persuaded us that their reasons were good. Sometimes we were able to persist with our rationale for a particular school. We completed the selection of school clusters with the conviction that we had gained access to a suitably balanced sample, free as one could expect a sample of ten to be free of misrepresentative characteristics.

An overview of the geographic location of our sites is shown on the map below.* It is obvious that the locations were not representative of all the country. We were pleased to get coverage of school situations in the newly envigorated Sun Belt and in the old inner cities of the North as well as schools East and West.** While the eleven sites possibly were not representative of the schools of the nation in certain ways, the key issues in these sites were found in the national survey issues in many school systems.



*While showing the regional location of the sites for Case Studies in Science Education the exact locations have been disguised to maintain anonymity.

**An economic description of the sites is included on page C:16.

While negotiating with the school district for access we indicated which high school or which kind of high school we needed for our sample. After identifying that particular high school we selected some of its feeder schools (junior high schools and elementary schools) to complete the makeup of a site's "school cluster." The original plan was to study all the feeder schools but most field observers found it overly demanding of time to study more than 2 or 3. In more ways than one, greater consideration was given to secondary schools.

Proportionate populations in the selected school clusters were different, of course, from the district population figures presented on page C:13. However, due to concern that minority population not be ignored, minorities may be seen to be overly numerous in the schools in which we worked.

In addition to allowance for ethnic and socio-economic diversity was a concern that the eleven sites would have a balance of curricular orientation--traditional or innovative--and differing reputations for science programming. These criteria were considered casually, checked out by asking around, both in and outside the districts, and these reputational definitions fell roughly into the following description.

Six sites were considered to have rather traditional curricula and four sites, more innovative curricula. Of the former, four had no particular science reputation and two had a good science reputation. Schools with innovative curriculum were located in two districts with good science reputations, and two districts with no particular science reputations. We did not feel the definitions rigorous enough to justify formal comparisons.

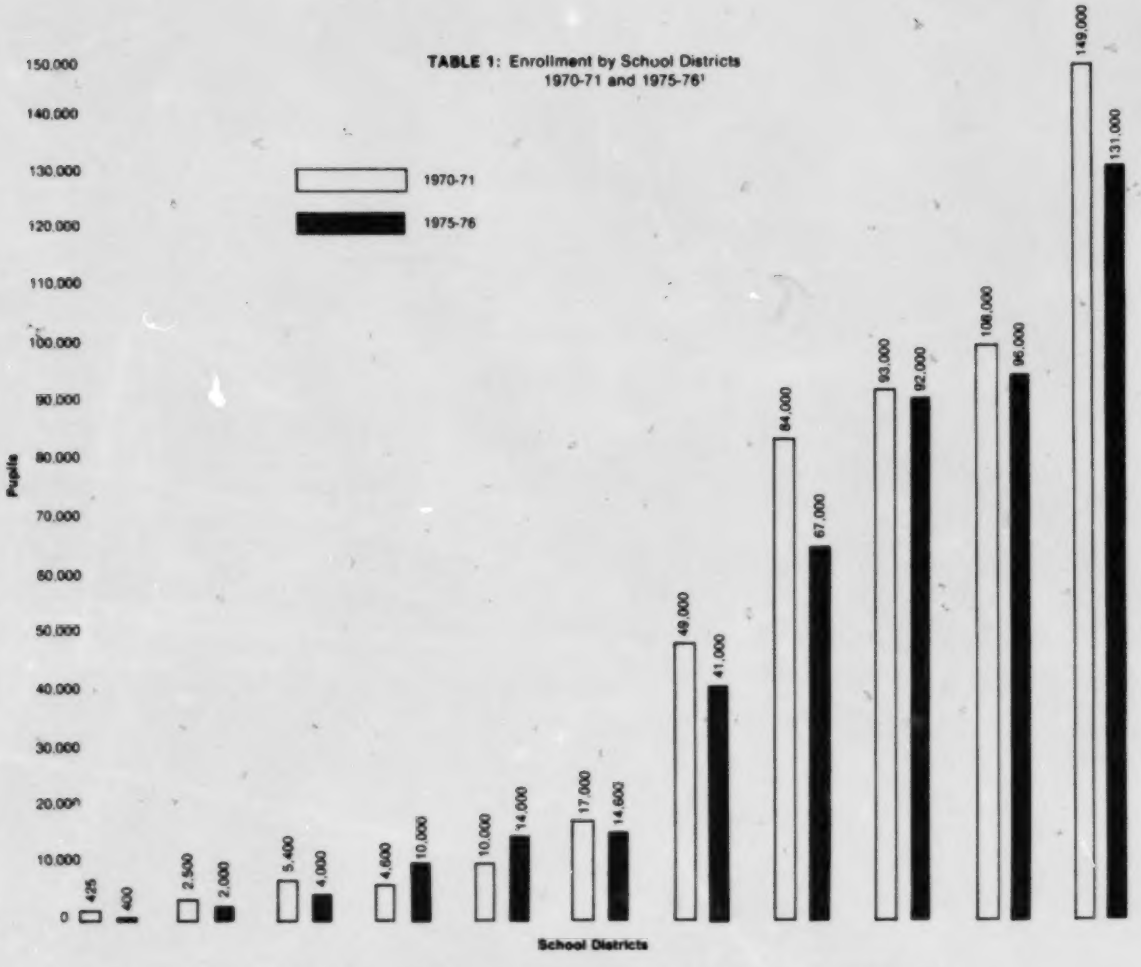
It is obvious that the characteristics of the school clusters in this selection were not perfectly blocked; as they would not be in any selection of eleven sites. The important goal here was to get broad and somewhat balanced representation of school situations.

Two "trial sites" were very important to the CSSE project. One is a small rural setting in central Illinois, the other a large upper-Midwestern city marked by ethnic neighborhoods and the demands of implementing a court-ordered school desegregation plan. We functioned in both places throughout 1976-77.

In October 1976, we conducted a trial version of the forthcoming site visits in Arcola, Illinois. Students, faculty, administrators, and townspeople reacted to scenarios and to questions raised during interviews. Our early sensitivity to issues posed by the "Back to Basics" movement was reinforced by their responses. Also in October, the CSSE site-coordinator spent a week in Milwaukee reviewing documents made available by city administrators and interviewing subject-matter supervisors, resource teachers, and representatives of the "Committee of 100," which fashioned the desegregation plan. The work in Milwaukee provided a fine opportunity to examine both the influence of racial matters in school-community affairs and the impact of pluralism upon educational policy and programs.

Respondents in each trial site later critiqued instruments developed for use in the CSSE survey.

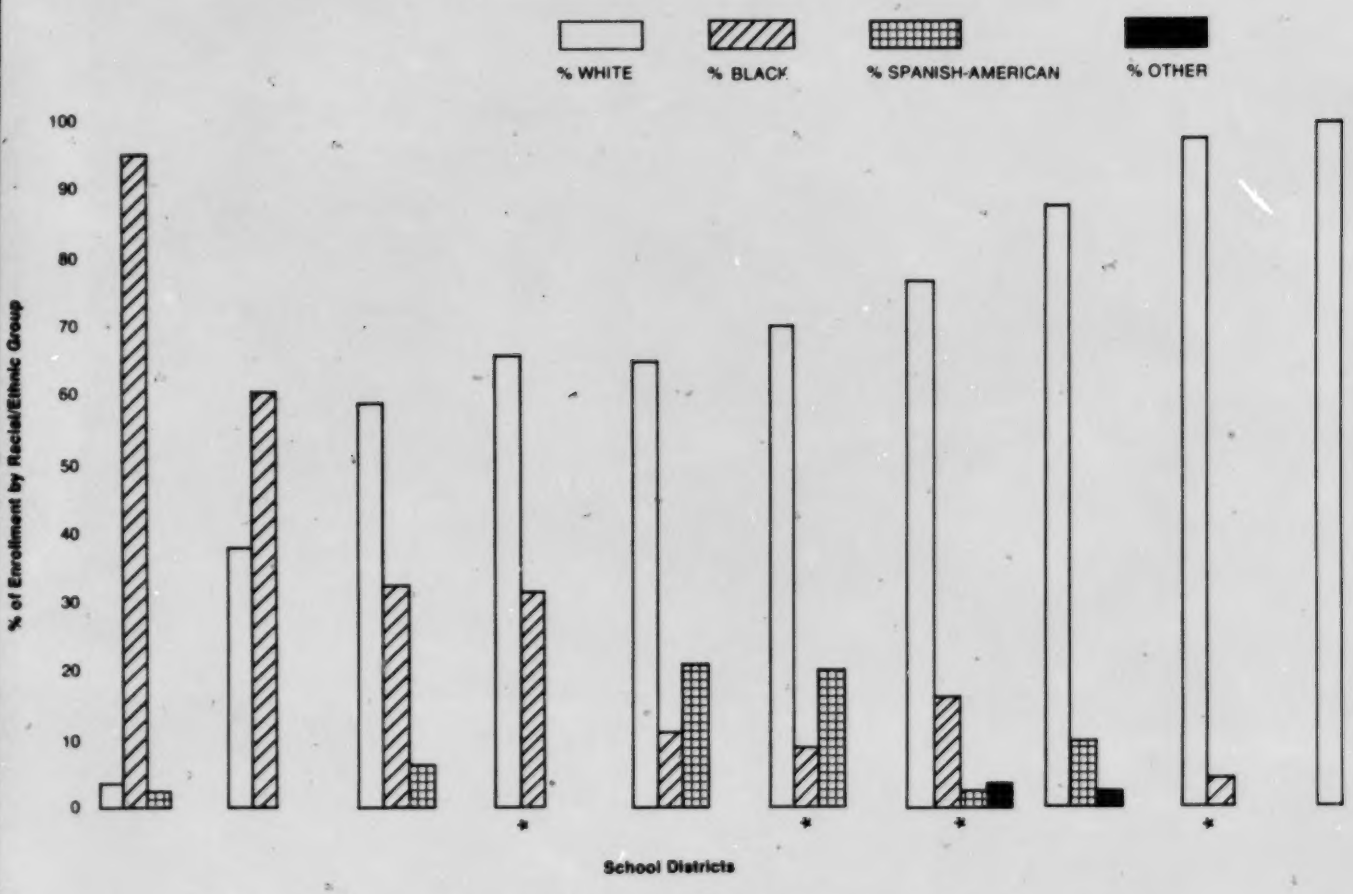
Site Description. The eleven sites studied were diverse. Size of a school system, population characteristics, and funding sources, are descriptive socio-economic statistics that usually come to mind when discussing a school district.* As depicted in Table 1, our sites included districts with enrollments of from 400 to 131,000 students. All but two districts were experiencing declining enrollments since the national high point of enrollment in 1970-71.



[1] National Center for Educational Statistics. *Educational Directory: Public School System* 1970-71, 1975-76.

*Demographic information that was obtained from public documents or Chief State School Officers is presented here with concern for the confidentiality of the site.

TABLE 2: % Racial/Ethnic Group Enrollment by School District 1972[1]



[1]U.S. Department of Health, Education and Welfare, Office of Civil Rights *Directory of Public Elementary and Secondary Schools in Selected Districts*. Enrollments and staff by racial/ethnic group, 1972, 1976.

*1975-76 Chief State School Officer with permission of participating school districts.

Almost half (five out of eleven) of the districts reported minority enrollments between 23% and 40% with two more school districts reporting minority enrollments of about 2% and 11% respectively. The extreme cases were two school districts with minority enrollments as more than half of their student population and two school districts with no minorities or so few as to be unreported.*

As can be seen in Table 2 eight sites enrolled Black students and six sites enrolled Spanish American minorities. In two of these sites the Spanish Americans made up two-thirds of the minority enrollment and in a third site were almost all of the minority enrollment.

As is common nationally, the minority staffing of the school districts in our case studies was consistently lower than the percentage of minority students enrolled. Two school systems had about 50% or more of their staff as minorities and two school systems had none or too few to be reported. The majority (seven) of the districts employed between ½ of 1% and 15% minorities on their faculties.**

The type of city and source of funding were also diversified. Nine districts received between 33% and 70% of their revenue from state and federal sources. The extreme cases were the rural southern community who received 92% of its funds from state and federal sources, and the suburban midwestern site which was least heavily supported with only 9% of its funds from the same sources (see Table 3). These same two sites were also the extremes in expenditures per pupil. The rural site was spending less than $1,000 per pupil*** and the suburban site was spending more than $2,000 per pupil.****

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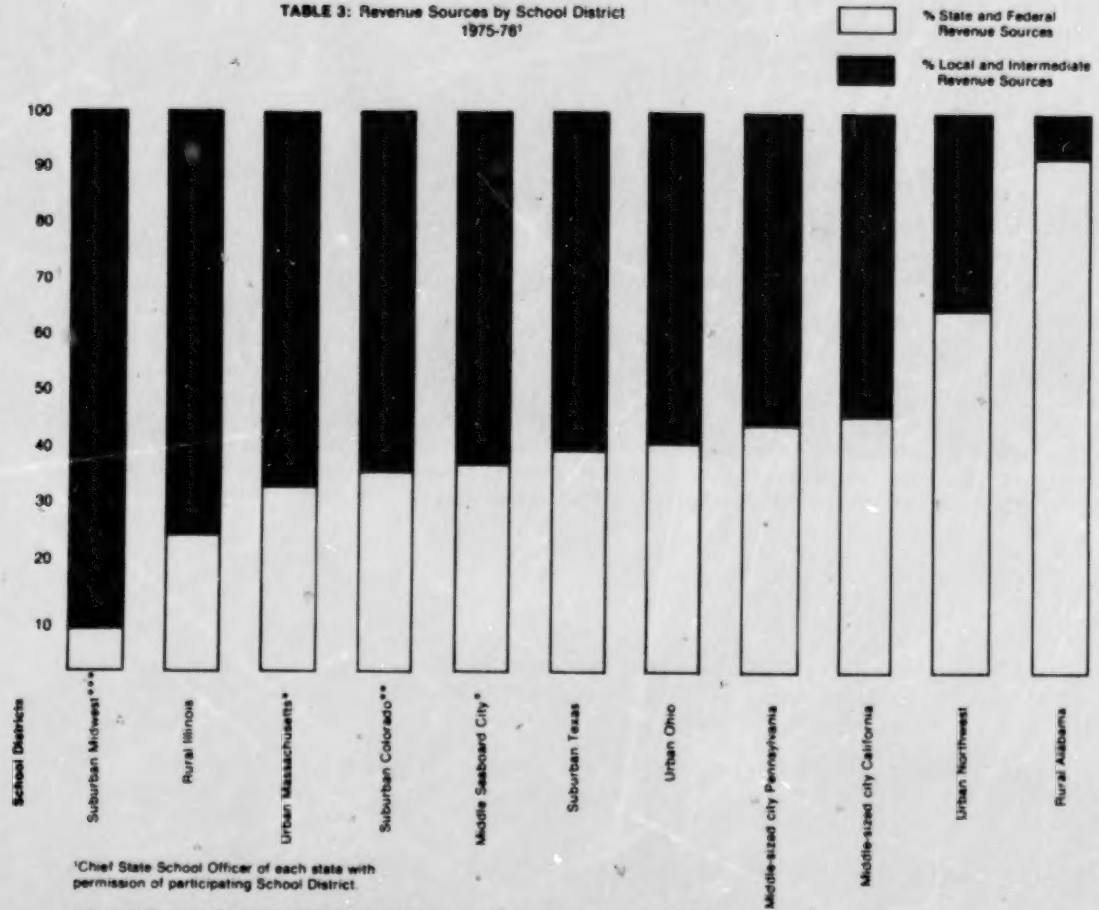
*There are no minorities at one site. (Chief State School Officer) And only 2% of the total population is reported as of minority composition at the other site. (1970 Census of Population, vol. 1, p. T:27, Table 39)

**U. S. Department of Health, Education and Welfare, Office for Civil Rights, Directory of Public Elementary and Secondary Schools in Selected Districts: Enrollments and Staff by Racial/Ethic Group (Washington, D. C.: U. S. Government Printing Office).

***Chief State School Officer with permission from participating school district.

****U. S. Department of Health, Education and Welfare, National Center for Educational Statistics, Statistics of Local Public School Systems, Finance (Washington, D. C.: U. S. Government Printing Office).

TABLE 3: Revenue Sources by School District 1975-76[1]



[1]Chief State School Officer of each state with permission of participating School District.

* National Center for Educational Statistics, Statistics of Local Public School Systems 1972-73*
1970-71**
1969-70***

Field Observation

At least for this project, no one method of field observation was seen as the "right" method of field observation. Methods were expected to change to fit the situation. Each field observer was expected to rely on methods which worked best for him or her.

We thought there would be more methods than there were. We expected some to use structured observation schedules, others to pore over the district's own achievement test results, still others to arrange some simulated decision situations. But time was short and things happened fast. Most observers were doing what was simplest and more direct, watching and asking questions.

According to the RFP the observations were to be made by site visit teams.* The CSSE design called for observation by participant (or ethnographic) observers, as well as by site visit teams. The field observer took the role of "participant, as a visitor." The observers observed, and as visitors, participated in the ongoing events of the system. They reported their obvious but not uncommon presence as researchers, carrying notebook or recorder down the hall and into meeting rooms.

Various degrees of obtrusiveness were noted by case study authors. We liked to think they were unobtrusive on most occasions. Rob Walker made note of the interest in him as a "foreigner." On occasion of course it was the observer observed.

Recordings. We originally planned to record science teaching and learning both in the conventional scaled-property language of the psychometrician and the incident-narrative language of the anthropologist. As it turned out, our case studies yielded little of the former, almost entirely the latter.

We wanted to make some simple aggregate-data statements about the classroom at various sites, including some rough indications of the modernity of the room, the text-boundedness of the pedagogy, and the frequency of references to "what science means." We thought we might find common factors or categories that would help us typologize the classrooms and their teachers.

Prior to the August orientation session we developed a checklist. A copy of the final revision is shown on the following page.

We devised this 8 1/2 x 11 checksheet that could be completed by the observer in less than three minutes. We left space on the sheet for the observer's reminders of what specially should be looked for on that occasion, and for notes about lesson, classroom activities, and science education issues encountered. Wanting a sheet that would raise few apprehensions and stir few curiosities, we tried to make it a blank-looking page.

Each observer was asked to make a minimum of ten classroom observations a week, and to turn in a completed sheet on each. We had hoped that this task would not interfere with the individual observer's normal observing activities. We counted on a minimum of 750 completed sheets, which even with the huge mix of classrooms, would give us some nice input for statistical analysis.

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*Has the RFP design been followed more closely the study would probably have been completed with a report something like, Office of Rural Development, Getting Human Services to Rural People (Department of Health, Education, and Welfare, 1976).

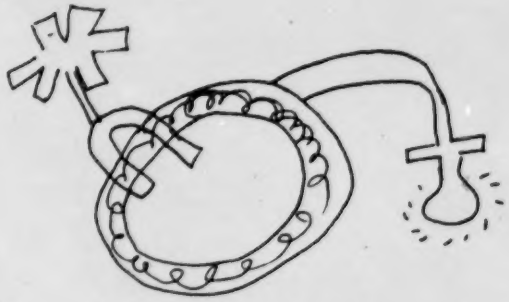
Observer: JAE School Code: LA Date: 10/76 Time: 2:00 To: 2:30
Teacher Code: MM Subject Matter Code: Scien Grade: 1&2 Time of write-up: 7:10 same day Y/S
No. students: 19 Teacher M (F) 25 35 50 65 experienced: L - (-) H directive: L - (-) H

SYNOPSIS OF LESSON, ACTIVITIES

Filmstrip with sound from a power company explaining the evolution of electric power with simulation model consisting of steam kettle, windmill, and rotating horse shoe magnet in inside a coil -- a flat penny held in a squirrel treadmill hooked to a burning 120 v light bulb, -- shots of cave people, candles, fires, Ben Franklin's kite with key being struck by lightening etc.

SCIENCE EDUCATION ISSUES

Teacher wants to know if the apparatus in the film strip would really work. Observer said, "no" but something like it might



* One boy talked with other observer about a university most of the time

DESCRIPTION OF ROOM
modern - antiquatd (+) - - a
mobile - fixd equmt (+) - - f
open - regulated ... (+) - - r
formal - casual .... + (-) - c
active - still .... a - (-) s
a learning place .. N - (+) Y
a science place ... (+) - - Y
a library place .... (+) - - Y
a competition place N (-) - Y

PEDAGOGY
text orientation . N - (-) Y
test orientation . N (-) - Y
experience based . N - (+) Y
objectives based . N - (+) Y
problem oriented . N - (+) Y
operations,drill . (+) - - Y
rules, examples .. (+) - - Y
integrated subj m N (-) - Y
diversions ..... N - (-) Y *

TEACHER AIM
didactic ... N - (+) Y
hueristic .. N (+) - Y
philetic ... N - (-) Y
KNOWLEDGE USE
replicative N - (+) Y
associative N - (+) Y
applicative N - (+) Y
interpretive N - (+) Y

REFERENCE MADE TO:
meaning of science .. (+) - - M
roles of scientists .. (+) - - M
sci vs. technology .. 0 (+) - M
scientific methods .. 0 (+) - M
sci as value-free ... (+) - - M
community, national . 0 - (+) M
politics, government (+) - - M
ethics,morality,relig (+) - - M
ecology, environment (+) - - M

REFERENCE MADE TO:
courses yet to come . (+) - - M
sci clubs,fairs,etc . (+) - - M
rdg,math skills needs (+) - - M
school budget ..... (+) - - M
TIME ALLOCATION
lesson ..... 20 min
other education ..... 5 min
admin, other non-educ . 5 min

But one observer said that it was contrary to his field-method to do any writing during his first months of observation. Another said that the scaled properties we were asking for were inimical to his frame of reference for classrooms and were likely to be distracting. He tried a few and asked to be excused. Another observer did a few, then decided with only four weeks available, classroom observation would reveal circumstances and issues too slowly. He shifted almost entirely to an interview approach. The other two fall semester observers went about the business of completing the scaling requested; but when it became apparent that the others were not going to provide these data, we made it optional, and they too stopped. We thought that we might be able to pick up some of these data in the national survey, but downgraded that information there too, and ended up without any property-scaled descriptions of the classrooms at our eleven sites.

Thus we presented to many a reader a major disappointment. It seemed important to them, even though we were working with a small number of districts, that we should at least give a careful coding to the instructional activities we found there. We chose instead to insist upon attention to our list of science education issues, foreshadowed and evolving. Wanting not to lose any of our observers, or their enthusiasm for the job, we did not insist on the use of the checklist.

Only later did we realize this to be a major choice point in our design. In so doing we committed ourselves largely to an instance-and-issue orientation in the case studies. But the choice point was earlier still. At the time we selected the first of our social scientists we apparently had unconsciously foregone the standardized checklist approach, for few of them were interested in having this side of descriptive work covered too. Of course even though our observers were rather agreed on this de-emphasis on statistical description, they were different in other ways of describing the field situations.

Techniques of Description. We found an interesting contrast in techniques of description within the case studies. In some, comparisons were made between a school's past history and its current situation in terms of population mix, curricular emphasis, or relationship to the outside world. Comparisons were made between the particular school site in which a field observer was working and past school sites with which he/she was familiar. More abstract themes were presented by some observers, leading to discussion of theory of educational achievement, learning theory, or competition and social interaction theory. Pictures and quotes from teachers and students were used as explicit examples of what the observer found. Literature was introduced as a means of inviting the reader to react to the field observer's analysis. Some examples are shown below.

For instance a type of comparison used by Rob Walker in the South, Lou Smith in the Midwest and Mary Lee Smith in the West was that of historical comparison. Reference to the past was used to structure description (p 2:1):

> The study of science education programs at a single site, FALL RIVER, Colorado, exposed bits of the history of the field. In this archeological dig can be found remnants of each era: the pre-Sputnik traditional disciplinary science--still used in some classes; the textbooks, equipment and institute-trained teachers left by the first two generations of National Science Foundation activity; the enrollment decline and disillusionment with science coincident with the romantic rebellion; the enrollment resurgence that has come with the new pragmatism; the recent popularization of the ecology movement. All of these historical eras have had effects at FALL RIVER, and all left some relic. In each case the impact was deflected or defused in some way, as if an alien culture had attacked an older one, entered its territory, but gradually lost its language and separate identity, absorbed into the older one.

Another type of comparison writers used was reference to previous conceptualization, especially how it was altered upon entering the site and engaging in participant observation (p 5:2-3):

> As I turned right on Evergreen Street and started down the hill, I noticed a sprawling yellow brick building outlined with white trim. A red, white, and blue Patriot (the school mascot?) painted on a single chimney stood guard over the school. A modern two story building, about a dozen years old, was nestled in a large grass-covered valley. A raft of tennis courts was flanked by football and baseball fields, and several adults were jogging on a path that circled the gridiron. Several temporary buildings, painted a dull orange, were behind the school and a large parking lot was filled with brightly colored cars. The whole setting was surrounded by an ampitheatre of green pine trees, yellow maple leafs, and manicured lawns leading from the street to single dwelling homes. For a moment, I thought I had escaped the city boundary and had mistakenly arrived at one of the surrounding suburbs. But no, the silver block letters to the right of the white pillared entrance clearly spelled out: HARDY HIGH SCHOOL 1965. As I pulled into one of four parking spaces marked VISITOR, I thought how far wrong my expectations for the appearance of the school had been. I locked my car doors and went through the main entrance. The halls were filled with students, talking and walking, and I was struck by how similar the picture was to the Milwaukee suburban school I left in 1963. I entered a door marked OFFICE and introduced myself. They were expecting me.

Another comparative technique was the use of the stranger to a situation. The stranger notices phenomena that the participants have long ago accepted and no longer consciously considers. For instance, Rob Walker stated (p 11:2):

> It's an interesting thing about the school that once inside you lose much sense of what lies outside. It's one of those things that is so obvious to all the teachers that they have long since ceased to question it.

Ethnographers often rely on theoretical orientation. In Lou Smith's study he invited the reader to see how his attention was directed to theory. This technique of reaching for a more general abstract theme runs throughout Lou Smith's study. He described an incident, then stated (p 3:22):

> I think what I'm reaching for is a set of reasonably simple hypotheses (mechanisms) on the antecedents, nature and conception of school learning with particular emphasis on explaining the high achievement levels of upper middle class kids, e.g., the two grade levels and/or 1+ SD above the mean on test scores.

Another interesting manner of pursuing a thought or explanation can been seen in Lou Smith's interpretive asides (p 3:13):

> As they talked it seemed to come out that different schools had different things going for them (as I'd heard previously). For example--one has a big outdoor education program, second grade and up, overnight camping, etc. Another is trying out some of the new CEMREL math materials in the primary grades, and so forth.
>
> ("Obs - All this suggests aspects of the old elementary principals competition, indentity, and place in the sun as a major issue in the dynamics of a district and efforts in curriculum, teaching, parents, etc.)

Explicit examples of what the observer heard or saw in the class were used extensively by Peshkin, Serrano, Denny, Walker, Hill-Burnett and both Smiths. Entire tests were included by Alan Peshkin because he "believes tests are particularly indicative of those things a teacher most values, though not exclusively, their students knowing." Pictures were used by Rudy Serrano, an advocate of visual anthropology. But Terry Denny said (1:1):

> Seeing may be believing, but I need more. I never see the picture worth a thousand words. It occurs to me that a very few words can represent a thousand pictures; can represent unobservable feelings; can reveal tomorrow's hopes and yesterday's fears which shape today's actions. My story is largely teachers' words.

All of these field observers made extensive use of direct teacher-student dialogue. This dialogue often included description of the context in which the interaction took place.

Reference to literature--poems, stories, plays and books--was yet another technique. Terry Denny used poems. Wayne Welch used a book, Working, by Studs Terkel, to describe a style of writing. Rob Walker used Steinbeck to suggest caution in interpretation. Lou Smith utilized educational literature to tell the reader his interpretation of a specific classroom situation (p 3:17):

> (Obs - Through all this I'm reminded of Brueckner's Diagnostic Tests in Arithmetic. The system seems a logical outgrowth of that point of view. Need to look at old NSSE Yearbook from 1934 (?) and the Bond and Brueckner Diagnosis and Treatment of Learning Difficulties. Need to check manuals. Seems like a teaching and organizational system (aides, storage and LRC) building upon that. Need to look at IPI manuals and reference literature.)
>
> I go through Placement Test C. There are 2-3 pages on each area. It does look like Brueckner writ large.

At another point Lou Smith used writings on philosophy of history to make an analysis about what he saw in ALTE (p 3:109):

> The historical perspective can lead also to a fundamental reworking of one's approach to the very nature of knowledge. Reading Toulmin's and Goodfield's triad of books on the history of science, Architecture of Matter, Fabric of the Heavens, and expecially The Discovery of Time in anticipation of the project was both provocative and unsettling in terms of specific ideas and conceptions in "Science" and also in the investigator's own conceptions of social science as it related to CSSE. In the preface to a later book Toulmin (1971) expressed it this way.
>
> > *The central thesis of the present volume . . . can be summed up in a single, deeply held conviction: that, in science and philosophy alike, an exclusive preoccupation with logical systematicity has been destructive of both historical understanding and rational criticism. Men demonstrate their rationality, not by ordering their concepts and beliefs in tidy formal structurals, but by their preparedness to respond to novel situations with open minds--acknowledging the shortcomings of their former procedures and moving beyond them. Here again, the key notions are "adaption" and "demand" rather than "form" and "validity" . . . The philosophical agenda proposed here sets aside all such assumptions in favor of patterns of analysis which are at once more historical, more empirical and more pragmatic. . (1971, pp vii and viii)*

His point of view is a large agenda, indeed. It leaves one feeling more than a bit presumptuous.

The zoning of parts of ALTE into 1 1/2-3 acre lots sixty years ago is a chronicled fact. The interpretations that this led to "executive city" or to the current upper middle class quality of the community and the emphasis on educational excellence is overly simple and open to question. The relevance of this thought to policy groups such as NSF or NIE and to more local immediate "change agents" however, does seem very great.

One reason for using an outside reference is to assist the reader to make his/her own comparisons. The literature is utilized as a backdrop for both the field observer and the reader to react to description in the case study. It should help explain how the researcher made his/her analysis.

Judgment During Observation. Field observers doing case studies are faced with a dilemma as to the degree to which their field notes should be composed of judgment-suspended observations. According to the "code" ethnographers are said to follow, raw observations should be emphasized because they permit the observer and others to go over the data with alternative questions, potential interpretations, and different frames of reference.

It is apparent however that the judgment-suspended mode of observation is itself a frame of reference, increasing the number of certain entries in the log, decreasing others. A transformation from "normal" observation occurs. Readers are denied some of the most direct vicarious experience. It may be said that they are reading a report of "laundered" data, data that no one sees directly. Their normal style of observing, of course, is a more judgmental style.

David Bohm made the point that, for the purposes of science, perception and communication should be--as nearly as possible--one and the same thing. This identity would, it is presumed, argue against judgment-suspended observations, for the scientist, as the layman, is more accustomed to interpretation-laden observations than interpretation-free observations.*

Selection of Field Observers

Each observer's report is essentially a description of the behavior of science education in its habitat. It includes a description of the context in which science education is conceived. It is conventionally "objective" in the sense that it is for the most part a shared perception--one that the researcher, site visitors and the participants recognized in common. It is "subjective" in that it was the field observer who decided which issues were pressing and which relevant to NSF needs. More agreement, of course, was found on what it was that was happening than on what was worth further study. At the outset, we wanted to select field observers who had experience with both the objective and subjective responsibilities.

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*David Bohm, "Science as Perception-Communication," in The Structure of Scientific Theories, ed. F. Suppe (Urbana: University of Illinois Press, 1974).

The field observers were to be the main CSSE data gatherers. They were to operate with a great deal of freedom to discover those issues important to people at the site. They were to be observers who had demonstrated their ability to produce insightful field studies and, if possible, already to have had some familiarity with the site. The selection of field observers was made with the intent of capitalizing on the use of experienced,* highly competent researchers who would broaden the view and minimize the subordination of the perspective to any one theoretical or methodological view. The need for inter-disciplinary purviews was argued by Szwed:**

> The training of urban ethnographers requires a reach across disciplines and departmental politics that few universities now seem able to accommodate. A well-trained student needs to combine the knowledge of a half-dozen fields with the skills of the classical anthropologists and those of the best journalists and reformer-investigators (such as Beatrice Webb, Henry Mayhew and Jack London).

He pointed out that,

> students with backgrounds in linguistics, folklore, history, English, sociology and American civilization as well as anthropology have studied bars, schoolrooms, geriatric nursing centers, apartment buildings, playgrounds and the streets . . . to build up a portrait of contemporary American life.

However, according to Szwed:

> it still remains to show how this research can best be used and interpreted by those who choose to use it.

We selected*** field observers with backgrounds in the fields of anthropology, sociology, educational psychology and various sub-specializations. Individuals with the "half dozen fields" experience and training suggested by Szwed, are not, to our knowledge, yet in supply. So our interdisciplinary and interuniversity needs were addressed by utilizing many people with different skills and training and hopefully with a high regard, interest and commitment to produce an interdisciplinary framework for the CSSE project.

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*It was with some dismay that we first realized that we were designing the study without lending to the support--financially and experientially--of graduate students. Later we found it possible, actually necessary, to enlist several to assist with the assimilation and final report preparations.

**John F. Szwed, "Anthropology Now Looks to the Cities for Field Trips," New York Times, 22 February 1976.

***If we had had complete freedom to design this study we would have made observations in perhaps six field sites for a year. Field observers of the talent we wanted (and later obtained) then would have cost us some $300,000 just for salaries, including university overhead. With $250,000 available for all expenses and a RFP requirement for at least 10 sites, we had to shorten the observation period. We budgeted about $100,000 for observer salaries, including overhead, and went out to see what that would buy. The people we wanted would work for an average of about $1250 per week, counting overhead. We picked out four sites (ALTE, FALL RIVER, GREATER BOSTON, and BRT) and budgeted for 12 weeks there. We budgeted for 4 weeks study at the remaining places. With these funds and good luck we were able to get all the longer observations and four of the shorter ones staffed with the field researchers we most wanted. The remaining two sites were staffed from within the CSSE headquarters team (by Denny and Hoke). Even with this large budget for field observer salaries these people were underpaid in that most remained at the sites longer than the minimum period and none were paid for the lengthy period of writing after observations were completed.

We assigned the original ten case studies to the following field-observers:

Terry Denny, University of Illinois; educational psychologist, specialist in evaluation of teaching materials; once a field survey researcher, grade school teacher; Ed.D. 1962.

Jacquetta Hill-Burnett, University of Illinois; urban anthropologist, researcher of intercultural education, author; once a science curriculum developer; Ph.D. 1964.

Gordon Hoke, University of Illinois; specialist in innovation and community-school relations; once a social sciences and gifted education teacher; Ph.D. 1965.

Alan Peshkin, University of Illinois; comparative education specialist, director of African Studies, rural school ethnographer, author; Ph.D. 1962.

Rodolfo Serrano, California State College at Bakersfield; anthropologist, bilingual/bicultural educator, author; once a physics teacher; Ph.D. 1972.

Louis Smith, Washington University of St. Louis; educational ethnographer, case study methodologist, evauation specialist, author; once a school psychologist; Ph.D. 1955.

Mary Lee Smith, University of Colorado; program evaluator, counseling psychologist, researcher on sex bias in counseling and psychotherpy, author; Ph.D. 1972.

Rob Walker, University of East Anglia; educational sociologist, field study specialist, author; once an inner-city math teacher, teacher educator.

Wayne Welch, University of Minnesota; science education re[illegible]r, educational psychologist; once a curriculum developer, physics teacher; Ph.D. 1966

Although our case study researchers are referred to as ethnographers, as evaluation specialists, as sociologists, anthropologists, and comparative education specialists, the case studies were undertaken using the general methods of field observation.* Each of our field observers was asked to use his/her own techniques--as developed across years of academic training and personal experience.

Orientation sessions were held in August of 1976 for the fall observers and in January of 1977 for spring observers. A few of the fall observers were available to attend the second orientation session thus providing additional continuity. Background readings included the following:

1. CSSE proposal and statements
2. "Organizational Structure and Student Behavior in Secondary School," by Cusick, Martin, and Palonsky
3. "'Degrees of Freedom' and the Case Study," by Donald Campbell (p C:27)
4. "The First Probe," by Charles Brauner
5. An abbreviated version of "Eden Grange," Rob Walker's SAFARI case study

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*We found those best summarized for field work by: Leonard Schatzman and Anselm L. Strauss, Field Research: Strategies for a Natural Sociology (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1973).

Such a qualitative research enterprise as we planned depends on the researcher's ability to make himself/herself a sensitive research instrument, partly by becoming acquainted with the perspectives of those studied. He/she must operate in two worlds -- the world of the subjects or informants and the world of the research perspective.

A reader needs to know what the researcher's original points of view were. It sometimes helps to know:

What was the researcher's role in the setting?

What was his/her training and background?

What was his/her previous experience in the field?

What were his/her theoretical orientations about relevant issues and personal feelings about topics discussed?

A few of these questions are answered in the biographies of the field observers and some within the introduction to the case studies themselves. For instance, Denny said (p 1:1):

> I am fascinated by what people do in schools and what schools do to people. My task as I saw it was to describe what people said and did about teaching and learning of science and mathematics from kindergarten through twelfth grade in the RIVER ACRES Independent School District, a suburban/rural setting in the Houston area. Not to evaluate it. Not to do anything about it. I once agonized over writing recommendations for schools I had evaluated or researched. Worse, I was nagged with the persisting question, "Was anything ever done? Tell me if anything was ever done." I now rarely write prescriptions for teachers. I went to Texas with no personal preference for self-contained classroom instruction, for open-space instruction or for homogeneous grouping of students. Moreoever, I am uncertain of the relative social importance of the school subjects as we commonly know them.
>
> It pleases me to write this story without the additional burden of formally judging the merit of the teachers and practice I observed. The fact that I was there and not you is of huge importance of course.

The personal involvement, how they felt personally toward people and events, can be found throughout the case studies. Louis Smith said:

> I'm amazed/struck by the seemingly flawless aspect of the system here. The aide has been with the program several years. She has no problem, works very rapidly, etc. At this end, the personnel, the facilities, the storage of materials, then plenitudes (nothing looks like it's even close to being out), the routines are all running smoothly. Need to look at other end.

The researcher went into the field as a sensitive instrument to gather information on science education and the context in which it is taught and learned. The case study reports belonged to those researchers; no editing was done of them other than what the field observers wanted.

Conceptual Structures

At each site the field observer was to observe the teaching of science, mathematics, and social science. Observers were acquainted with the CSSE list of potential issues, derived in part from the NSF RFP, but were relatively free to choose what persons and actions to observe. As a general rule of thumb it was expected that about half of the attention would be given to the physical sciences and a quarter to mathematics and a quarter to social sciences. (To be sure, it was expected that there would be a great many issues worthy of consideration that would be no more identified with one subject area than another.) The rule of thumb was not to deter probes of any educational or professional issues of local concern. The search for consistencies within the uniqueness of each site, each classroom, was stressed by Robert Stake:*

> One thing common to all authors and users of case studies is the search for a pattern. All researchers are interested in regularity, in consistency. Even in the most unique of persons, even in the most unique curricula, even in the most unique of bond-referendum campaigns, there are certain patterns.

Validity. Although we pursued the particularity of each site, for the NSF, generalization was the goal. We wanted to make these studies useful to people, not because we were interested in some particular place or even in some particular idea. We looked for a kind of generalizability based on deep understanding of phenomena which increases one's opportunity to recognize similarity and analogy. Each case study depends on this kind of generality. It depends on extending the reader's existing apprehension of experience through new vicarious experience. The general then is a very personal general. Previously Stake called it "naturalistic generalizability."** To be a good basis for comprehension or policy setting the generalizations should be based on valid observations.

We saw it essential to prepare as valid a presentation of science teaching as we could. But this did not mean to us, to make the most objective account we could. Objectivity often can be increased best by omitting elements that are subject to different interpretation. To do so is to risk omitting some of the most vital considerations.

All representations are couched in meaning: Numbers, photographs, words, whatever. Someone invented all these things for the purpose of sharing meanings. Some meanings of representations are widely shared. Everyone agrees that it is 3 (not 2 or 4) people in the room. To the extent they agree we say that the representation, here the numeral of enumeration, is "objective."

Some meaning is not widely shared. "The people here are fundamentally good people." The meaning is subject to different interpretations. Different observers and readers will differ as to the meaning of the words as well as to the claim that it pertains to these particular people. To the extent people will disagree as to the accuracy, meaning and the associated implications of the represenations, those representations are more "subjective."

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*Robert E. Stake, "Seeking Sweet Water: Case Study Methods in Educational Research" (Urbana, Ill.: Center for Instructional Research and Curriculum Evaluation, AERA Training Tape Cassette, forthcoming.)

**Robert E. Stake, "The Case Study Method in Social Inquiry," Educational Researcher 7 (February 1978): 5-8.

We would strive for objectivity, as long as it did not cause us to lose important meanings. There are many exceptions to the belief that the more objective representations are the useful. "There were 3 or 4 people there, all of them good people." Of the two representations in that sentence, one more objective and one more subjective, it is impossible to say out of context which is the more useful.

In seeking ways to make our CSSE representations useful we of course did try to minimize those biases of personal view and acculturation that contribute most to misperception and misunderstanding. These are subjective criteria, of course. We tried to recall or imagine how a representation can lead to confusion, neglect, or injury and finding none, to judge that representation as having avoided the worst forms of invalidity.

One of the primary ways of increasing validity is by triangulation.* The idea comes from sociology (and from navigation at sea). The technique is one of trying to arrive at the same meaning by at least three independent approaches. Naturally a finding that has been triangulated with several independent data-holdings is usually more credible than one that has not.

Triangulation somehow has come to have a divergent as well as a convergent connotation. To some people it means taking additional viewpoints in order to encounter the multiple realities of the situation. This aim was prominent in CSSE, but we used the term "triangulation" to mean converging to a focussed representation of any one viewpoint.

CSSE triangulation occurred both within and across case studies. The field observers sought out informants having different positions, roles, experience, attitudes, and goals in order to check the perceived constancy of a phenomenon. The observers themselves observed, interviewed, and analyzed documents. Their findings were reviewed by site visit teams, site coordinators, and on-site educators.** All provided additional views as well as confirmations or disconfirmations of particulars.

Writing each case study remained the responsibility of one person, the field observer. Independent observations were conveyed, particularly by site visitors, to CSSE headquarters. Many taped interviews were analyzed by a specialist in linguistics well experienced in science education research (Peg Steffensen). Survey data were added to the site visit and case study data. Triangulation occurred across CSSE sites as multiple researchers examined the issues manifest in data from multiple sources at the eleven sites and from the national sample.

What we can say with assurance is that what we report was there to be seen. The emphasized things were seen many times over. What we cannot say is that the things we report were the most important things to be seen or that we have interpreted them in the best way. Also, we cannot provide an index number that indicates the degree to which our findings are valid. That is a disadvantage of all naturalistic observation, but naturalistic observation reports have the great advantage that the readers can participate in the determination of validity, especially to the extent that the observations cover some matters that they are already familiar with.

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*For a discussion of triangulation see: Donald T. Campbell, "'Degrees of Freedom' and the Case Study," Comparative Political Studies 8 (July 1975): 179-191. The strategy was discussed more generally in D. T. Campbell and D. W. Fiske, "Convergent and Discriminant Validation by the Multitrait-Multimethod Matrix," Psychological Bulletin 56 (1959): 81-105.

**On site administrators in particular were used as reviewers of draft reports. Earlier they had been assured the privilege of review, to result in a statement of substantiation or refutation of the case study at their site. While all such reviews were to be read carefully, the final decision as to what to include in the case study report remained with the field observer. From our California site came the only major statement of refutation. A member of the district superintendent's staff sent a statement which is included in Booklet VII with the WESTERN CITY case study.

A case study is valid if it gives an accurate and useful representation of the case in a certain setting--with reference to certain research questions. Accuracy of observing and reporting is more than a matter of everyone seeing the same thing, for many observations cannot be made independent of the observer's point of view. The validity of a case study then is dependent on the observer's point of view, and its utility to a reader will be dependent on recognition of that point of view. To some this sounds hopelessly relativistic, but it is consistent with Lee Cronbach's 1971 definition of validity.*

This kind of validity pertains to the use that is made of the report. If the resulting comprehension or action is of a higher quality than it would have been without the report, then the report is to some extent valid.

Clearly we are not willing to claim that in order for a report to be valid the observations reported need to be those another observer would have reported. We would of course question the validity of the report if among those who were at the same scene, nobody saw what was reported. The report is not necessarily invalid, it just has not been validated.

To be validated a report needs to be confirmed through other observers, it needs to survive deliberate efforts to disconfirm it, and it needs to be credible. This latter is to acknowledge that previous experience can contribute something to the confirmation, and that it is validity "for use by persons" that we are most concerned about. If a report strains credulity, then it will need much more confirmation to attain a certain level of validity. If a report contains the highly expected, then we will spend less of our resources challenging it.

Validity should be considered less than complete if no effort has been made to disconfirm the observations, even if they have been confirmed.

During an extended visit to a complex site, only a small portion of happenings will be seen, and only a small portion of those seen will be reported. An important isolated event may occur. The idea of inter-observer reliability of reporting may be pretty nearly lost in such a situation but the idea of validity holds.

What is expected by readers is that the observer will look carefully and skeptically, striving to see more than is easily seen, looking for missing connections, moving to different viewpoints to see the same happenings; then doubting what has been seen, striving to see once again, being skeptical about what is being seen, seeking other interpretations of what is seen.

The question of validity of field observations and case studies will probably be debated for some time. In these studies we considered it our obligation to report what seemed to us to be of most importance, that which we could validate as well as that which we could not. We tried to indicate to the reader the effort we made to substantiate different findings and to share with the reader as much of the burden of deciding what weight to put on the presentation.

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*Lee J. Cronbach, "Test Validitation" in Educational Measurement, 2d ed., ed., Robert L. Thorndike (Washington, D. C.: The American Council on Education) 1971.

Salience of Topics. What an observer pays attention to and reports is partly a subjective choice, but subject also to disciplined experience. Not only are some questions previously indicated to be of greater importance, but the importance at the site of some topics is easily recognized. The case study worker makes the decision partly on what presumably will be useful to the audience. Experience helps make good presumptions.

Three principal questions initially guided the CSSE project.

1. "What is the status of precollege science teaching and learning today?"

2. "What are the conceptualizations of science and science teachers held by teachers and students?"

3. "What happenings in school and community are affecting the science curriculum?"

These questions are broad and provocative. And by honoring the educational and professional concerns of science teachers we did not entirely meet the expected attention to subject orientation. Some field observers found the state of science education so overwhelmingly influenced by state or federal laws, budgeting demands or enrollment declines that they elaborated on these contextual variations. For instance, lack of resources for science supplies in Alabama demanded sustained teacher resourcefulness. In our Eastern middle seaboard city, agencies acting as youth-advocates, acting to keep children in school, made it much more difficult for teachers to teach. At the same time the schools' immediate usefulness to these children was questioned by both the children and the teachers. And a small school with low enrollment in our Illinois site meant little student interaction in science and in fact less science than other places nearby.

In all sites there was pondering and even distress over what the issues were. Several of the field observers chose to organize at least part of their study around a conceptual structure or theme. For example, Terry Denny's study (RIVER ACRES) examined "education as preparation." Jacquie Hill-Burnett's study (ARCHIPOLIS) described opportunity to learn among the other "rights" of students. And Rob Walker organized his case study (PINE CITY) around the progress of desegregation efforts in an Alabama community.

We were asked why in the CSSE final report we gave high attention to "textbook teaching" and little attention to the preponderance of males in high school science departments. Both seemed equally true. The textbook issue was an early candidate for attention in the final report because it was mentioned several times by one field observer and because it struck the authors as relevant to the presumed interests and responsibilities of final report readers. The possible exclusion of women from science faculties did not come up as a possible major theme from any of the observers. When mentioned at all, it was not seen as something to be high among the presumed interests and responsibilities of readers. The textbook orientation was considered a tentative finding when perusal of the case study drafts indicated that it was a rather common circumstance. The finding was seen as departing somewhat from project staff expectations as to what would be happening in science classrooms; thus it became a more frequently mentioned theme. The field observers were polled to see if they had counter evidence to the findings; they reported none. From the beginning the "textbook teaching" topic was recognized as something several of the research team already had more than a passing interest in. The question of bias was considered and felt not to be elevating a non-issue to issue status.

So it appeared that the basis on which this and other topics of the final report were selected was partly a matter of each of the following:

a. commonness at the sites
b. relevance to questions raised in the RFP and proposal
c. interests of staff in the topic
d. departure from staff expectations as to what the science situation was
e. presumed usefulness to audiences of the final report.

Definition of Case Study

Each case study was organized around a somewhat different conceptual structure. That structure is tailored to the particular case. According to Louis Smith, the case study is mainly different from other educational research studies in that it is*:

> the study of a bounded system. The crux of the definition is some conception of unity or totality to that bounded system. . . . The key notion is that you've got some kind of entity, a case, and it has some kind of unity. Somebody perceives a part of that unity and wants to study some more of it.

Stake put the difference this way:

> So the principal difference between case studies and other research studies is that the case is made the focus of attention rather than the population. In most other studies, researchers search for an understanding that ignores the uniqueness of individual cases and generalizes beyond particular instances. They search for what is common, pervasive, and dependable.
>
> In the case study, there may be or may not be an ultimate interest in the generalizable. For the time being, the search is for an understanding of the particular case, in its idiosyncracy, in its complexity. Its uniqueness is not considered "error variance." Its uniqueness <u>is</u> considered "a handle" for better understanding the way the case does or does not maintain equilibrium under environmental stress and strain.
>
> The principal difference is one of focus. It is not the experimentalists' focus on precise variation in a single criterion revealing the aggregated reactions of many cases to specific treatments. It is not the historian's concentration on the complex-mediated connections between antecedent and subsequent events. It is a focus on the happenings around a single actor (be it child or institution or enterprise), so as to understand that actor, that bounded system, in its habitat.
>
> So what is being studied is <u>the case</u>. The case is something deemed worthy of close watch. It has character, it has a totality, it has boundaries. It is not just an instance representable by a score; it is not only an entity which could be represented by an endless array of scores. It is a complex, dynamic system, something to be thought of as an existing entity, even when simple descriptions are being made of it. The case study tells a story about a bounded system.

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*Robert E. Stake, "Seeking Sweet Water: Case Study Methods in Educational Research" (Urbana, Ill.: Center for Instructional Research and Curriculum Evaluation, AERA Training Tape Cassette, forthcoming).

Our CSSE case studies were the products of field observers who observed, interviewed and analyzed. The authors selected a conceptual framework on which to lay out their case. The report was partly a product of their intensive academic training, partly a product of their socialization into a community setting and partly a product of their values. Most authors made reference to the possibility of another story at another time or by another person. It was recognized that there probably were many potential conceptual frameworks. That fact should not preclude the validity (discussed in this chapter elsewhere) of the current story. Each case presented had its boundaries--boundaries set by the authors in the sense that they wrote the story. However, others helped set the boundaries.

The people who set the CSSE boundaries were those who cared about the science programs. That included teachers at the scene, the NSF, and it included prospective readers of the case studies. Certain things belong to the case, according to their expectations--so the boundaries of the case were set partly by those people (anywhere) interested in the case.

We had to have boundaries. One cannot deal with the totality of anything. Some strong claims have been made for the case study as dealing with the "complete" story. Of course it does not do that. It is extravagant to claim that the case study tells the whole story. But it does deal with unity of the case, the unity of the experience, in ways other research methods do not.

That leaves us with a pretty loose but workable definition: that the case study is a study of a bounded system, emphasizing the unity and wholeness of that system, but confining the attention to those aspects that are relevant to the research problem at the time. The definition of case study does not indicate whether more formalistic or more naturalistic observations are to be made. We chose to make the CSSE observations naturalistic.

Arrangement With Schools

To facilitate the arrangements between the CSSE project staff and the administrators at participating schools, we formed what Gordon Hoke called a "temporary system."* It responded to demands stemming from the following activities:

1. Obtaining access to sites
2. Minimizing disruptions of school activities by CSSE observers
3. Expediting the gathering of field data by CSSE observers
4. Facilitating communication among
   a. the principal observer on site (the field observer)
   b. the coordinator (a University of Illinois faculty member)
   c. the local school liaison person (administrator or their surrogate)
   d. others
5. Preserving the anonymity desired by individuals and institutions
6. Facilitating a three-day visit by a four-person team to each site, and
7. Making the close-out arrangements

The person in charge of making the arrangements for CSSE was Gordon Hoke. Negotiations for access to the ten sites and CSSE staff behavior within them were guided by the writing and work of two distinguished ethnographic researchers, Roger Barker and Art Gallaher, Jr.

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*See p C:47, Project Management.

Primary and official contact was with the office of the superintendent of each district. Originally we had anticipated and hoped that a local science or math teacher would become a liaison person. However, in operational terms our liaison continued to be with administrators or their surrogates. Details of arrangement, of course, were in part made with the principals and the science, mathematics, and social science teachers at the participating schools. A written agreement was made known to the National Science Foundation and CEIS.

Possible Bias by Cooperation. Cooperation of administrators in school systems is necessary for a case study of the kind we wanted. By and large we found administrators and teachers quite ready to cooperate. A potential bias should be noted. Since matters were arranged through administrators we may have moved toward situations where there was little antagonism toward administrators, which might not be a general condition. It is possible that in sites where administrators are more beleaguered and on the defensive that the perception of the needs of science teaching and learning would be different. However since only one superintendent turned us down, the fault would have to be in the original list of sites.

Of course, the sites in which we worked were not totally free of administrative problems. There were some for example, in one district that required the replacement of a building principal (shortly after our site visitation terminated). In some schools morale was very low among the faculty--for a variety of reasons, e.g., lack of student motivation, lack of supplies or lack of administrative support. Several good, young teachers in a couple different places, planned to leave not just the system they were in--but leave the profession of teaching entirely.

Anonymity and Confidentiality

Our intrusions into the life of the school were carried out with concern. Not only disruption, but embarrassment and misrepresentation were constant possibilities. One protection rested in the anonymity of sites and persons. Our concern was expressed in CSSE Statement #4 (on the next page).

At the beginning it was presumed that--after clearing the reports with all persons possibly jeopardized--the actual names of cities and schools would be publicly revealed but personal anonymities would be preserved. The interpretation of case study data is usually improved, we believed, if the reader's knowledge of these places can be combined with the case study portrayals. At project finish, we realized that person by person clearance was too enormous a task, so site anonymity was preserved too.

CSSE STATEMENT NO. 4
CONFIDENTIALITY

Stake
6/11/76

A case-study approach in educational research--even when the case is not a person or groups of persons--is likely to be personal. The concentrated study of teaching and learning, an intense examination of meanings and priorities, is likely to expose teachers, students, administrators, and others to unusual scrutiny. The personal dimensions of responses here are not going to be obscured by hundreds of others as they are in survey research.

All case-study research--and particularly that sponsored by governments--has a special obligation to provide legal and ethical protections.

Even for persons observing the highest standards of moral, ethical, and legal conduct, a study of ideas or actions can be an invasion of privacy and subsequent publication can add stress to relationships with colleagues, students, and the general public. The normal way of life is not one full of openness and exposure. A case-study inquiry even into notions of science may raise questions which lay bare commitments that provoke approbation.

Essentially the same questions may be raised elsewhere with little need for protection. If a casual acquaintance raises such questions, the respondent feels free to answer or avoid the question. If an official raises such questions in an employment interview or promotion review, if a teacher raises such questions in the course of student examinations, if a citizen raises such questions of a candidate for election to the school board, the respondent is under some obligation to answer but with the understanding that that is part of his responsibility there and with the potentiality of personal benefit. Confidentiality is less an issue if the respondent has placed himself/herself in the review situation and has something to gain from the review.

In the CSSE research situation we are agents of a national bureau using public moneys, observing and asking questions without obviously having something to offer in return. The respondent makes an important contribution to the research. He/she increases the flow of information that may serve to correct a problem. These contributions may give the respondent satisfaction, but he/she will probably receive no other recompense for the risks taken.

The same argument pertains to institutions although obviously they do not have the same rights and vulnerabilities as persons. A school itself has some real chance of being embarrassed, beyond the embarrassment suffered by individual educators or students. The findings of a case study might result in embarrassment to the community that itself constitutes that school. (Whether or not the embarrassment is or is not justified is not relevant at this point. It is not the responsibility of the CSSE study to root out individual or institutional infirmities but to perceive national commitments and problems.) By granting our request for access and assistance, we believe the individual school and the individual persons we observe and question are entitled to anonymity--should they care to exercise it.

One of the requirements for this study demanded by the National Science Foundation, the sponsor, was the right to retain any and all data, findings, and documents. No release is to be made without the explicit authorization of the Projects Officer, an NSF official. For whatever other merit it has, this requirement could serve to extend the protection for a school or person studied. Yet additional control of data release is needed--particularly control by those who might be hurt.

CSSE STATEMENT NO. 4
(continued)

In their case study research Barry McDonald and Rob Walker have established a policy that a person owns the data on himself. They have routinized the return of transcripts and narrative descriptions to the people concerned for review, correction, and possible confiscation. The respondents are asked to judge the material on the basis of its accuracy, fairness, and relevance. MacDonald and Walker report, however, that, contrary to popular expectation, people (including bureaucrats) seldom exercise the options other than occasionally a request for correction of fact and fail even to claim anonymity in those rare instances when they have behaved in a way that some people would consider reprehensible. A respondent review procedure has merit apparently but is cumbersome, open to capricious threat to the research investment, and does not always serve its purpose.

Lou Smith has advocated reliance more on confidentiality and anonymity. He tells almost no one whom and where he is observing. He uses pseudonyms, falsified noncritical descriptions, and makes composite narratives from isolated events. He even considers publishing under a pseudonym. This policy has the considerable disadvantage of denying the reader the opportunity of applying what he already knows about the case. But it does grant a greater protection to the people at the site.

For the CSSE project we intend to follow the lead of these colleagues, granting anonymity and review rights. Prior to NSF consideration of release, the persons who have been observed and those who have given us their observations will have opportunity to review the case study materials. They will have full right to withhold any information that identifies them. Though asked to base their decisions on accuracy, fairness, and relevance, they will not be obligated to show that the information is objectionable on those grounds. They will not have the right to withhold information gained from contact with them if the opportunity of identifying them with the data is negligible.

The location of the sites and the names of the people will be kept confidential. Participating school officials will not be encouraged to publicize involvement in the study. Of course, they may choose to do so and to publicize the case study of their school cluster, once duly released. It is likely that some schools will eventually be reported with full identification of names and places and that others will be reported with person-and-place anonymity. The CSSE staff will try to maintain a strict anonymity at the outset and relinquish it only when mutually desirable to do so.

Complete anonymity is impossible. Project staff in the field will know where they are and with whom they are working. Someone must know how to get in touch with them. NSF must have some indication of where the work is being done for its accountability procedures--hopefully no more than one person (and a sealed envelope) in Washington need know. There will be a small number of people (perhaps for each site) who will know where we are--we will urge them to be discrete.

These may seem like drastic measures to take for such a benign and impersonal inquiry. Perhaps so. It seems to us that they are costly and even bothersome procedures but justified for the protection they may give and for the increase in openness and honesty we may expect while probing basic understandings and feelings. If we find that our procedures are extravagant and unwarranted, we can relax them. If we start out without them and find we should have had them, we may be unable to fulfill our contract to identify the meanings of science and the threats to science education at the precollege level in the USA today.

Clearance Procedures

Given our policy on confidentiality and anonymity, clearance procedures were needed for the case studies and other data reports. Our guidelines stated:

> Case studies and other CSSE reports are to maintain anonymity for cities and schools unless no objection to identification is found. Anonymity for persons either as actors or informants has been guaranteed and should not be compromised.
>
> The author of the material has the primary responsibility to clear it. He/she can circulate rough or smooth materials to each person who is involved. Question should be raised as to whether or not the place or persons can be identified, as well as to pertinent inaccuracies. (Irrelevant inaccuracies may be introduced to assist in maintaining confidentiality.)
>
> Persons should see only those materials that relate to themselves as actors or that include information they provide--plus sufficient context to get a full meaning of what is being said. The writer should direct the reviewer's attention to those items deemed crucial to personal identification and those bearing most directly on important issues for the particular case study or total CSSE project.
>
> A particular problem occurs when an episode requires clearance from two or more persons but part of the critical information is not known to all of them. Some of the information may have to be censored from the review--and possibly from all reviews at that site. This would be done only to protect an actor or informant from exposure.
>
> If there is information on record that will indemnify a person who explicitly or implicitly granted us access to this information, then all the data information should be destroyed when no longer useful for analysis, and not later than the date of the submission of the project final report to NSF.
>
> When all personal episodes have been cleared for accuracy and anonymity the site coordinator should clear it with the school authorities at both building level and district level. Again, checks should be made for security of identity of persons and accuracy of fact and implication.

An illustration of our guidelines translated into action at the final stage of transcript review is shown in a communication to VORTEX reviewers by the field observer there.

To: Readers of the VORTEX Case Study

From: Gordon Hoke

Re: The contents

1) I tried very hard to hold the material to about 4,000 words or 20 (double spaced) typewritten pages. Acknowledgement of this standard meant that a great deal of information had to be eliminated.

2) Much of the data obtained in VORTEX, in my judgment, carries great significance for the organization and management of schools and will be useful as resource material for other parts of our final report.

3) The "mini-portrayals" and lengthy quotes are typed in double-spaced fashion to expedite your reading. They will appear in the usual format in the final version.

4) VORTEX readers: please indicate questions, corrections, etc., on individual pages and return them with the enclosed envelope.

5) A complete edition of the final report will be forwarded early in 1978.

The drafts of the case studies seemed to include very few anxiety-producing or indicting revelations. A number of people who reviewed them for revision found inaccuracies and were disappointed sometimes in the tone or choice of incidents to portray--but there were almost no expressions of need for improving or even preserving anonymity.

In retrospect we believed that anonymity remained an important matter. We did not learn much about how to handle it, partly because our case study writers seldom presented information that put any one person in jeopardy or even cast them in a "bad light." Our clearance reviews were too casual, too occasional. Our records do not sufficiently show that all persons potentially in jeopardy did have an opportunity to review and did give us assurance that publication was not contrary to their interests. We were comfortable that persons were in fact reasonably well protected. The field observers and site administrators effectively established a climate of "trust." Institutions were left anonymous not because they needed it but because it was too much work to "declassify." Still, better techniques are needed.

SITE VISITS

The second phase of our project was the site team visits. Since our observers would not usually see more than one site, making it difficult to draw together a general picture, multiple-observers were used to confirm the existence of phenomena or attitudes, to help develop survey scenarios, to assist the field observer in difficult tasks, to add the views of certain specialists and to gather additional data on issues of special interest.

The design of the visit varied from site to site. Usually it consisted of a team of four to six members on site for three days toward the end of the field observation period. (This is graphically portrayed in Chart 1.) The visitors were to overview the site and provide confirming or disconfirming information to the field observer for the preparation of the case study for that site, and to further the preparations for writing the assimilation chapters. Interviews were regularly tape recorded for later analysis.

Site Coordinators. Each site team was coordinated by a project staff member from the University of Illinois:

Terry Denny, specialist in evaluation of teaching materials
Jack Easley, science and mathematics educator
Gordon Hoke, specialist in innovation and school-community relations
Robert Stake, educational evaluator
Charles Weller, science-teacher educator

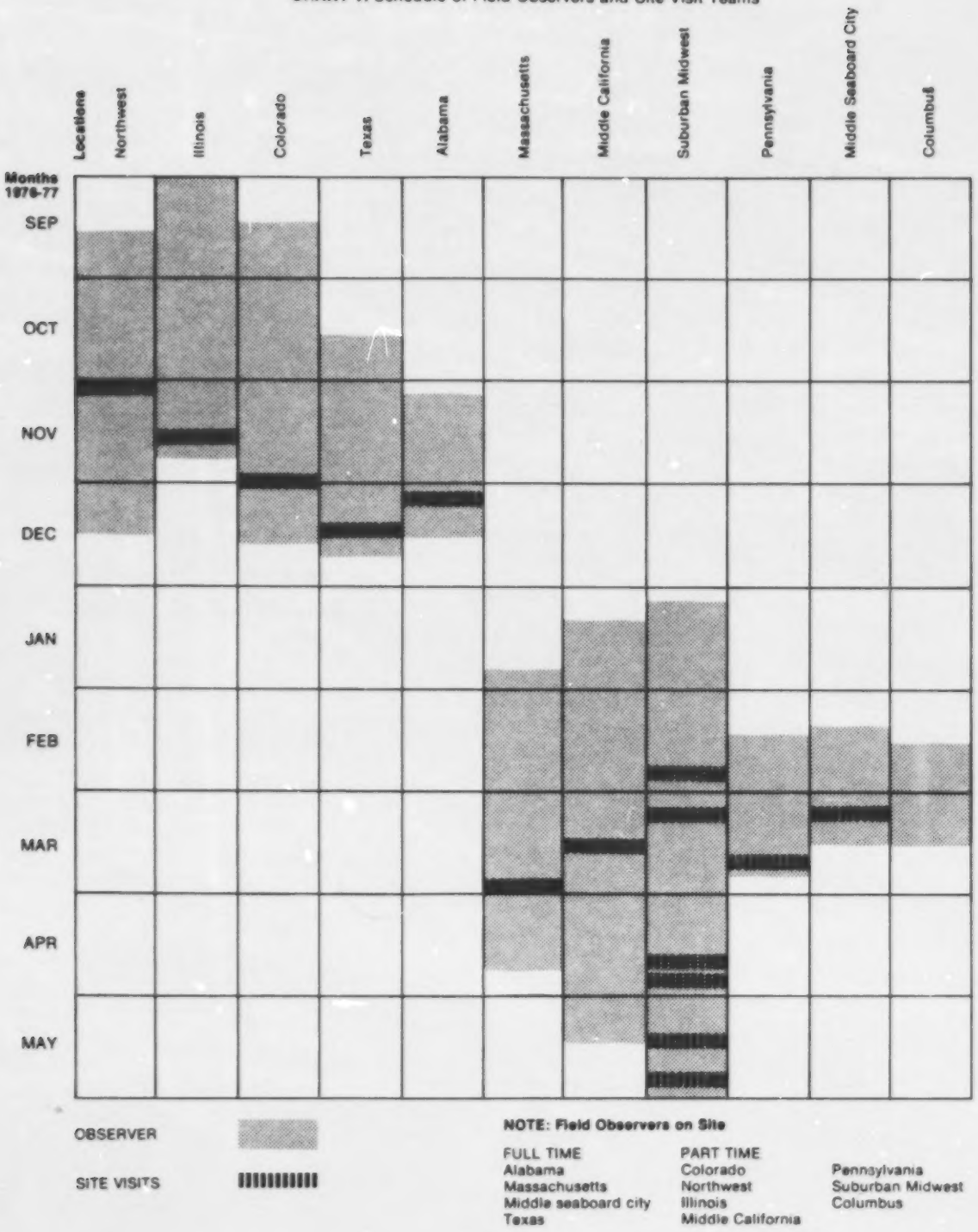
Typically, the site coordinator visited the site early in the work there and then returned to make arrangements the week preceding the site visit His duties included selecting the members of the site team and identifying the key respondents from the site. He was to link the questions identified for probing to particular site team visitor's interests and expertise, and to find particular respondents thought to have ideas, information and feelings about those questions.

Composition of the Site Teams. A team was usually composed of a member of the local community, a math and a science educator, scientists, educational policy people, or experts in evaluation strategies. These members of the team were selected for their particular expertise in scientific and educational matters. The theoretical perspectives represented by the site team members included disciplinary allegiances to the natural sciences, mathematics, psychology, sociology, anthropology, and linguistics.

Previous knowledge of the school system under study was an important factor for selecting at least one member of each team. In several cases they were local community members; in others, people who had previously been involved in consulting at the site. Local people on the team were helpful. They often could clarify issues that were being discussed and helped us gain access to teachers and others.

In the round of site visits during the spring the same general pattern of site visitor backgrounds was retained but the site team was more likely to include CSSE personnel who would have responsibility for writing sections of the final report. By this time issues were being clarified and extensively discussed among CSSE personnel. As more of these people were included as site visitors, the more intense and immersed in the issues the project headquarters became.

CHART 1: Schedule of Field Observers and Site Visit Teams



Site Visitor Responsibilities. Each site team member wrote a report at the site or soon after leaving. All of the site reports were descriptive. Some contained vignettes, some were evaluative, and a few concluded with recommendations One was a critique of teachers and math classes. The methodology of participant observation and interview was common to many members of the site teams but uncommon to others. There were large differences in what the site visitors did, although all reports were written from classroom observations, formal and informal interviews, and written data sources. Examples are included at the end of the VORTEX, URBANVILLE and GREATER BOSTON studies

The arrangement of interviews, discussion sessions and observations were opportunities for site team members to pursue their principal responsibilities. The tone and spirit of these responsibilities perhaps was captured in CSSE statement #25 (on the next page).

Data Collection. While we were primarily committed to studying a particular topic--science education--we were also committed to studying the specific context--a school cluster --the circumstances under which science education occurred. Our belief in the influence of context on teaching and learning led to the investigation of many topics deemed important to a school district. We were of course aimed at description--as might be expected from this statement by McCall and Simmons.*

> *In general, choosing the organization in terms of the topic tends to be associated with theory testing, whereas, choosing the topic in terms of the organization favors description and discovery of theory.*

Interview assignments were usually given to each site team member by the site coordinator in consultation with the field observer. The intent was to enhance the utilization of the personnel on the team as well as gather data on questions identified as important at that site. By the time of the spring site visits those issues which had emerged from previous sites were included in the probe. An example of this is seen in an urban site where the site coordinator (Stake, Middle Seaboard City) defined the observational-interviewing needs in this way:

Dunkum (Science Supervisor)
- Science and math curricula: Are texts and materials suitable?
- Support systems: Where does a teacher go to get help?
- Special education: Is mainstreaming burdening the classroom teacher?

Meyers (Elementary Classroom Teacher)
- Elementary education: How substantial is the content?
- Student motivation: Do teachers have rewards that students care about?
- Counseling: What are counselors telling students about science and math?

Rodgers (Professor in Early Childhood and Elementary Education)
- Social studies: Is there any social science being taught?
- Administration: What obstacles are there to improving teaching quality?
- Political climate: How strong is the influence of the local news media and city council?

Stake (Co-director of the Project)
- Curriculum: How strong is the back-to-basics movement?
- Articulation: Is there conflict between options and uniformity ethics?
- Test scores: What is happening to student achievement?

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*George J. McCall and Jerry F. Simmons, eds., Issues in Participant Observation (Reading, Mass.: Addison-Wesley, 1969), p 66.

CSSE STATEMENT #25
SITE VISITOR RESPONSIBILITY

Stake
October 29

What this country needs perhaps--even more than a 5¢ cigar--is a succinct statement of how science education is seen here at this site. As a site team member you should assume a primary responsibility to author such a statement.

Your statement will differ of course from those of others on this team, and from those on other teams. It should reflect your own experience and value-commitments. But it should not be your view of science education. It should summarize your view of their view of science education. Science education includes mathematics and social science education.

The case study is a study of the people involved in science education at this site. It includes students, teachers, parents, administrators and others. Of course from this brief visit you won't know all views or even a good representation. But you will quickly know some views that are worth the consideration of distant readers.

Your statements can be brief. Perhaps no longer than 300 words. It is needed rather soon. Perhaps you will write it while you are still on the site.

The purpose of the site visit is three fold: to report new issues (and interpretations of issues) regarding contemporary science education; to confirm or disconfirm the observations of the field observer; and to refine the statement of issues in scenario format for a subsequent national mail survey. The site coordinator will worry about most of this. Your statement will help toward all three purposes.

A second responsibility of each site visitor should be to review the draft of the case study when the field observer prepares it. Reactions to confirm or question major findings are needed at that time.

The total CSSE project has 3 principal questions to answer. 1. What is the status of precollege science teaching and learning today? 2. What are the conceptualizations of science held by teachers and students? 3. What happenings in school and community are affecting the science curriculum? Your statement and review may direct attention to one or more of these questions.

We don't really know if the country needs our answers to these questions. But we hope to have a good supply of well substantiated answers.

Generally, the visits were organized to include situations for data collection with the site team members interacting with common data sources--teachers, students, administrators, curriculum supervisors, and parents. One schedule was summarized as follows:

Night before: Discuss site and issues with observer and coordinator, set up division of responsibility. Debrief field observer.

And in the next three days: Meet school officials, discuss current programs and problems, visit several schools, hold interviews in groups and individually. Present issue-scenarios to teachers, administrators, and citizens in groups of three to eight. Hold summary of issues sessions with project personnel.

In arranging the site team three-day visit coordinators tried to maximize the amount of information already available at the site. They provided written information to site team visitors in the form of newspaper clippings, school district newsletters, and demographic descriptions of the site. Discussions with the field observer provided other basic data on the community to the site visit team. These discussions were held previous to the first entry into the schools.

Coordinators also tried to provide time for reconnoitering discussions by site team members and field observer throughout the visit. These situations provided opportunities for clarification, amplification, and substantiation of observations and interviews.

In addition, coordinators tried to provide information for refining and modifying the scenarios for the national survey. (See section C:4 and Chapter 18.)

These scenarios were to reflect more than the immediate problems in a local district, yet retain a sense of immediacy and relevance to the local teaching and learning situation. This combination was difficult to achieve in the site visit interview situation. While it was generally found that the scenarios served as "ice-breakers" for discussion and seemed to orient people to the purpose of the interview, few respondents spoke directly about what was in the scenario unless asked. Our lines of questioning pursued their responses and were spontaneous more than they were probing of the scenarios. Site visitors used and helped modify the scenarios less frequently as the project progressed.

It would be inappropriate to describe a visitor's presence on site as "complete observer." There was never complete removal from social interaction. Neither were they "complete participants" in the sense of pretending to be an aide, teacher or consultant. Our introduction to respondents always identified us as researchers from outside the school district. And our tape recorders and notebooks were ample evidence of our intent to gather information.

The predominant mode of operation was that of "observer-as-participant" since we were involved in one-visit interviews and observations. This role usually entails brief contact with many respondents; however, with the assignment of a local person to our team and the site coordinators arrangement of topical areas of concern to particular site visitors, the time spent with respondents on particular issues was maximized.

Under these circumstances both individual and group interviews were held. Interviews were regularly tape recorded. They included respondents from the community as well as students, teachers, and administrators. In the case of community members and in keeping with our commitment to anonymity, it was left to the discretion of the school district to invite community members. We did get useful information about citizen feelings concerning local and national programs of pre-college science, math, and social studies.

Meetings open to large numbers of volunteer informants from the community were abandoned early. There appeared little interest on the part of the community members. However, informal and formal interviews with individual parents as well as with small groups of community members or school personnel were successful when invitations were personally extended, particularly if by a member of the school system. We found individual interviews to be conducive to frankness and opportunity for clarifying issues.

Situations with larger groups of people permitted respondents to react to each other and provided the site team with insights not otherwise available. For instance, one site visitor had observed what he considered an authoritarian style of teaching in the classrooms. He described it as the "shout and bang method of instruction" and thought it might be exclusive to the classroom. However, during an informal gathering of several local school district personnel he observed its more general character:

> In all classes which I observed (they all happened to be taught by men) the mode of teaching was by shouting out the information and banging on the desk with the flat of the hand for emphasis. Even a teacher who was mild mannered and softspoken in a private conversation with me shifted into this style when he got "into" his lesson and the adrenalin started to flow. I thought this behavior might be unique to classroom situations because the acoustics were so bad, but after sitting through friendly discussions in the men's lounge and a social hour with several principals, in which the walls of the room fairly shook from the "bellowing" at each other, I became convinced that the classroom technique was only a specialized case of a much more general mode of communication. The amazing aspect of these situations was that none of the participants were at all offended by being shouted at--in fact, one participant even changed his mind in the midst of one of those seemingly "heated discussions."*

Respondent Sampling. The CSSE approach to sampling of teachers, students, administrators, and parents consisted of three general approaches commonly used in participant observation.

The first--"some sort of quota sample" was used most often. It provided us with information from the categories of school district "members" just cited. We interviewed and observed at least a few people from each of these categories. They were often selected and introduced to us by administrators in the local school. Often we talked with respondents that we met informally in lunchrooms and teachers' lounges. Or occasionally our local team members knew of people we would be interested in talking with and introduced us to them.

The second type of sample--"the snowball sample"--was used when a site team member found an issue that needed clarification or elaboration. The original respondent then directed the site team member to others in the school system who might have the desired information, and they to still others.

The third type--"search for exceptions"--was employed more commonly as the identification of issues progressed. This approach was utilized when a relationship between categories of people and/or events was taking on the appearance of a hypothesis and time and opportunity permitted its use.**

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*Charles Weller, Site Visit Report.

**George J. McCall and Jerry F. Simmons, eds., Issues in Participant Observation (Reading, Mass.: Addison-Wesley, 1969).

Participant observation with the emphasis on observation and interview, rather than participation and interviewing, a group site team visit, and assignment of team members to an area of concern to the field observer or site coordinator were the characteristics of nine of the school district visits. In ALTE we utilized a different site visit design. In Columbus, Ohio, we held no site visit.

Site visit reports from URBANVILLE and VORTEX are appended to the case studies. They illustrate how the site visits provided descriptive data that the field observer felt extended information he or she did not have an opportunity to pursue and confirmed or clarified the general overview of the case study. With another case study (GREATER BOSTON) a site visitor's report portrays a contrasting view to that of the field observer Rob Walker. This brief report illustrates the inherent strengths and flaws of case study methodology. It is less a matter of which viewer is right or wrong and more an issue of what is important to and valued by the individual observer.

Site Visit Design for ALTE. The suburban midwest site was handled slightly differently both in terms of the site team concept and the amount of participation of team members. The site coordinator, Jack Easley, described it in the following manner:

> In keeping with the CSSE project desire to adapt the site visits to the varying expertise of the site team observers two changes from the fall semester site visit design were made in one school district, ALTE. One of the two efforts was to select site visitors with expertise in programs that were of current interest. The second effort was to schedule visitors at several different times rather than as a team effort. (See Chart 1, p C:38) These changes were made, primarily, to permit observers to get into the workings of the curriculum development process in the schools, which appears to be unusually active at this particular site. The details of the changes included the following points:
>
> 1. We have sometimes chosen site visitors for a particular site because of their expert knowledge of a particular problem the school district is facing, and we have used local citizens and scientists on site visit teams in part because of their interest in and knowledge of the site. It is therefore only another step in the same direction to have site visitors with a particular expertise desired by groups working in the schools on curriculum development or program reorganization. This permitted the site visitor to play the role of consultant to the school district as well as to the CSSE personnel.
>
> 2. For the school district the visitors were chosen so as to cover as many of the aspects of the science, math, and social studies programs as possible within the allotted budget. And they visited at times that optimized their ability to contribute to the program development process.
>
> 3. The spreading out of the site visit in time permitted a more natural integration of the visitors' interactions into ongoing curriculum and organizational development of the schools. It also permitted the field observer to observe this interaction and thereby discover in a more concentrated time span the kinds of use the school normally makes of consultants in different curricular areas.
>
> 4. This use of site visitors provided an opportunity for a more concentrated effort on specific topics--teaching and learning. Observation and interviews were more articulated and focused on these topics in order to provide a more in-depth analysis of particular issues for curriculum development.

In sum, an in-depth opportunity was provided to integrate the site visit(s) into ongoing work in the curriculum process at this site and extensive quotes from the site visit reports were included in assimilation Chapter 16, The Teacher In The Classroom.

SURVEY

The survey, described in detail in Chapter 18, was planned originally to provide additional interpretations and information on the extent of generalizability of case study data. Issues developed in Phase I and II were to be the primary conceptual structure of the survey. These issues were to be portrayed through an issue-scenario.

The scenarios first developed from verbatim quotations recorded at our sites were found to be too fragmented and too frequently rejected by our try-out questionnaire respondents and onsight reviewers. As we departed more and more from the descriptive detail of the site situation we saw it decreasingly possible to capture the complexity of local issues. We moved gradually toward describing more general situations and toward issues as they were seen generally. The emphasis was then shifted to a more contrived, purposive scenario based on what we perceived to be major issues in the field and the literature. With this approach our purpose changed also from one of confirming the case study findings to gathering fresh information on key issues.

Multiple Case Study Project

> It may be useful to distinguish between a case study project which is the persistent study of a single case and the multiple case study project, which is a collection of individual case studies--where one tries to make the several case studies alike in some ways to provide a synthesis of findings to the reader trying to understand the whole collection.
>
> Special research procedures are needed, of course, for the multiple project. Unfortunately, those procedures are not well developed--so far it is pretty much a matter of following one's intuition.*

Natural science seems to progress rapidly in comparison with social science. One reason is that natural science chooses problems to solve for which the methodology has been perfected. They choose problems that can be assumed to have solutions. However, social scientists usually do not select problems according to the sophistication of the techniques they have available. Important problems to be explained are constantly pursued regardless of whether the appropriate methodology has been well developed.**

If as Francis Bacon suggested, "truth emerges more readily from error than confusion" and the sense of situations can only be acquired after some action has been taken*** then we should act and reconsider in order to move along toward making sense of the situation. That is what we tried to do.

Obviously multiple case studies demand a form of linkage--a manner in which to discuss their differences and similarities. The methodology for aggregating wholistic data from multiple observers at multiple sites and comprehending the overview is one that is little examined in the methodological literature. However, large scale projects that we are aware of have allowed for a number of independent pieces of fieldwork and reporting that provided some fascinating cross-site comparisons. The descriptive account of the case study is the basis for these comparisons.

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*Robert E. Stake, "Seeking Sweet Water: Case Study Methods in Educational Research" (Urbana, Ill.: Center for Instructional Research and Curriculum Evaluation, AERA Training Tape Cassette, forthcoming).

**Thomas S. Kuhn, The Structure of Scientific Revolutions (Chicago: The University of Chicago Press, 1970).

***Karl E. Weick, The Social Psychology of Organizing (Reading, Mass.: Addison-Wesley, 1969).

One method was being used by The Center for New Schools in Chicago. They were studying ways school people go about trying to solve their problems. They had ethnographers in nine different school districts around the county. It also was a multiple-case project. In this project, The Documentation and Technical Assistance Project, Tom Wilson and his colleagues sought an understanding of how to enhance the capacity of schools to solve problems through knowledge utilization of research and the experience of practitioners. The limitations of disseminating information for problem-solving exclusively through the case study approach have been noted.* These limitations led project personnel to explore different methods of aggregating case studies. Their primary method included use of a computerized coding system, converting ethnographic data to bits of natural language reports coded and stored in a computer.

Another method proposed for dealing with the problem of aggregating data from case studies is to analyze the content of case studies with a closed-ended questionnaire containing questions regarding pertinent issues. The resulting analysis becomes "case survey method." It may allow an analyst to aggregate the case study experiences across sites.** Cases that do not have information for the questionnaire are dropped. This may be more suitable for developing theory than for understanding a particular group of situations. It neglects key information that is available in a case study report--the context of a situation. Context is utilized more for decision making.

A lovely example of the use of a case study for decision-oriented findings is David Hamilton's "The Case of the Missing Chairs." The question was whether or not, in a new primary school, with open classrooms, to provide one chair for every child, or fewer chairs. A trivial question? Not in terms of cost, and not in terms of instructional method. Here are three paragraphs from Hamilton's report.

> *In 1973 the situation changed. The plans for the new lower primary building had reached the state where a seating level had to be decided. Consensus among the staff was difficult to achieve since individual members reacted differently to the idea that seating levels might be reduced below one chair per child. . . .*
>
> *To resolve this issue the headmaster of the school was asked to act as an arbitrator. By his decision the seating level was duly fixed at sixty percent. In principle this action closed the debate. In practice, however, the teachers were left with a possible alternative: if the designated seating level proved inadequate, it could still be topped up with infant-sized furniture left over from*

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*Steve Wilson, "Influences on the Usefulness of Case Studies" (Paper presented at the Annual Meeting of the American Educational Research Association, New York, 5 April 1977).

**Robert K. Yin and Karen Heald, "Using the Case Survey Method to Analyze Policy Studies," Administrative Science Quarterly 20 (September, 1975): 371-381.

> *the old buildings. The flexibility of this arrangement became apparent when some of the ordered furniture failed to arrive in time for the opening of the new building. The old tables and chairs were immediately pressed into service and, in a complete reversal of the original intention, were "topped up" by the new furniture as it arrived. Eventually, a surplus of chairs was created--which meant that each teacher could operate their own seating policy. Some chose the figure of sixty percent while others retained at least one chair for each child.*
>
> *This arrangement did not last for very long. Within a term all the teachers had built up their seating levels to at least one hundred percent. The topping up, however, did not herald a return to class teaching. Quite the reverse: as shown below it marked a recognition that an adequate supply of chairs was necessary to the individualized and balanced curriculum that the case study teachers were trying to implement. Thus, despite a certain sense of public failure among the teachers who tried to work with a reduced provision, the intervening experience had taught them a great deal about the relationship between teaching methods and seating requirements. . . .*[*]

It is not surprising that case study research can be used to aid in the understanding and resolution of a local problem. But the Hamilton study is illuminative for teachers and administrators of primary schools in many countries.

Although Hamilton's report is single issue specific, and our case studies are not, we made use of issue-specific thinking in our assimilation chapters.

Project Management. As indicated earlier, we set up a Temporary System to organize and operate the project. It was based on high personal contact and conventional filing systems.

The temporary system operated out of Room 260 Education, at the University of Illinois in Urbana. The five site coordinators (Stake, Denny, Easley, Hoke, and Weller) officed there, with short and long-term visitors, graduate students, and secretaries. On a typical occasion one might have found a couple of coordinators plus Kip Anastasiou working on the "elitism" topic, Helen Simons helping draft a statement on field methods, Peg Steffensen coding tapes, Jo Day coding incoming research reports, and Gordon Hoke telephoning an assistant superintendent.

The coordinators came and went, briefing others, filling file folders. Seminars ran almost continuously, a couple for course credit (led by Charles Weller and Bob Stake), others informal. There were long running conversations with graduate students and interested colleagues about such tasks as issue formulation, analysis, scenario writing. There were debates on the significance of this or that finding.

Scrapbooks, window panes, file drawers, cabinet filled up. Telephones rang. Decisions were about adding or dropping a site, subcontracting, clearing the site visitor list with NSF. One secretary was kept busy most of the year just on travel arrangements and vouchers. These were normal administrative concerns, yet most interacted with content and method

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*David Hamilton, "The Case of the Missing Chairs," Education 3-13 4 (October 1976): 113-116.

of this multiple, simultaneous case studies project. Issues emerging from the sites colored the administrative decisions, which in turn reflected back on the field work. Were the coordinators too intrusive? too demanding? This temporary system functioned, fought out and strained at the issues, "doing its damndest with its mind(s), no holds barred," as Percy Bridgman* said it ought to function.

The most important finding is that there is no inquiry going on out there.

Was there ever any real inquiry?

Maybe that wasn't important.

Pupil motivation is the real issue--

But that's not always a thing teachers worry about.

Yes, but they should.

Well, that's not our problem.

Out of the confusion of too many issues, too many personalities, there gradually emerged a tentative consensus of findings. It took a lot of such argumentation within the temporary system to set aside (even temporarily) NSF rationales for course content improvement and to examine the rationales of classroom teachers and others.

DATA STORAGE AND RETRIEVAL

Data were collected by the field observers, site visitors, and the survey questionnaire. The formal mechanism for data transmittal to the project were respectively the case study, the site visitors' reports and tapes, and the responses to the questionnaire. The collection of these data was discussed in the sections labeled as Case Study, Site Visits, and Survey. These data were stored and retrieved in natural language (except for Survey) to form the basis for most of the issues discussed in the assimilation chapters. These issues, especially from the case studies and site visitors' reports, are local issues. Local in that they are embedded in a local context. However, these local issues can be and are discussed as universal issues sometimes finding confirmation through our national survey and at other times in current news articles or the professional literature.

In this CSSE project we addressed local issues as foreground and more universal issues as background. Both came into focus in our assimilation chapters. It is often the case that an issue at one site is prominant at many sites--like the issue of "back to the basics."

Our coding and aggregation system (see p C:49) emphasized natural language and permitted the retention of the context in which the issue was addressed. It permitted an analysis of the conditions under which such issues as "back to the basics" are of vital concern--as well as analysis of the multiple understandings or definitions of "back to the basics," etc., offered by our respondents.

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*Percy W. Bridgman, "The Prospect for Intelligence," Yale Review 34 (1945): 444-461.

CSSE STATEMENT No. 30
CATEGORIES OF TOPICS

Stake
Dec. 9

e
Epistemology
Conceptualizations of science

ea = science as the seeker of knowledge
eb = science as a vocational tool
ec = emphasis on college-preparation
ed = concern about humanism
ee = emphasis on biological science
ef = scientific analysis and inquiry
eg = the teaching of "values"
eh = science as value-free inquiry
ei = hierarchial aspects of knowledge
ej = the utility of science
ek = elitism of science
el = keeping scholarship standards high
em = basing knowledge on experience; hands-on

p
Pedagogy
School-University Split

pa = teacher education curricula
pb = training stressing theory vs practice
pc = relating to kids; child-centered teaching
pd = no language for kids' ideas
pe = teachers' values, styles
pf = teacher as diagnostician
pg = learning the logic of wrong answers
ph = class heterogeneity
pi = classroom discipline
pj = student motivation
pk = emphasis on competition
pl = resources for aiding teachers; inservice
pm = summer institutes and such
pn = teaching the textbook; teaching the test
po = quality of teaching materials, equipment
pp = tracking
pq = competence of teachers

c
Curriculum
Back to the Basics

ca = the 3 R's
cb = course mastery, proficiency diploma
cc = molecularization, learning modules
cd = specificity of goals
ce = uniformity across classes, schools
cf = articulation
cg = metrication, decimal fractions
ch = hand calculators
ci = outdoor education
cj = taboo subject matter
ck = Mr. Science
cl = the counsel counselors give
cm = the math curriculum
cn = nonschool learning opportunities
co = sex education
cp = social studies curriculum
cq = facts vs concepts; skills vs understandings
cr = remedial courses
cs = the science curriculum

s
Socio-economics
School and community

sa = budget cuts, economic support
sb = reduction in teaching force
sc = enrollment drop, class size
sd = employment of youth
se = social pattern of youth
sf = demographic changes
sg = local vs state-federal control
sh = parent, community pressure
si = school organization and management
sj = shrinking role of the school
sk = desegration/integration/busing
sl = bilingualism
sm = mainstreaming; equal opportunity
sn = teacher associations, unions
so = difficulty; expectations of difficulty
sp = accountability

The issues were found in explicit discussions and in descriptions. As tapes and documents were received at "headquarters" the sections were coded, often multiply coded, as potential information for sections of the assimilation chapters. They were duplicated and hand filed in notebooks under specific assimilation chapters and subchapter headings. Newspaper articles reflecting CSSE issues in a broader context were coded in scrapbooks. Particularly relevant professional literature was coded and filed in file drawers and on bookshelves. The notebooks, scrapbooks and files were kept in one place in the CIRCE offices, accessible to all who worked on the project.

The codes used at one time are shown in CSSE Statement No. 30. These codes functioned as flags for the authors of assimilation chapters and subchapters. It allowed them to sift through the information collected on an issue and to organize it in a conceptual structure. It also permitted them to go back to the original source of the data to reconfirm or change interpretations. The coding system was useful in getting things organized, but as final deadlines neared, it seemed less necessary than we thought it was going to be.

Our data processing operations were:

1. interview tape analysis (Peg Steffensen)
2. site visit synopsis and newsletter (Gordon Hoke)
3. survey processing (Beth Dawson)
4. materials classification (Jo Day)
5. indexing (Kathy Jaycox)
6. issue analysis (Bob Stake)
7. conceptual analysis (Jack Easley)

Each operation was assigned to the particular person shown but it was a joint effort involving many people. It demanded a high level of intercommunication among CSSE personnel. Our approach to the task was one of maximizing personal contact of observers, site team coordinators, and headquarters personnel. Fortunately these people enjoyed working and enjoyed working together.

WRITING, ANALYSIS, WRITING, ANL WRITING

The time to prepare the case studies after observation, both for the field observers to write and for the issue analysts to analyze, was not amply allowed for. We had planned to read all the case studies in June with each person in charge of pursuing an issue marking out what belonged to him/her and what ought to be considered by someone else. Our inability to work with all the studies at the same time clearly influenced the way issues were developed, though it did not become clear what implications this might have. For example, we analyzed the pressure for uniformity and belief in hierarchial subject matter while studying the rural case studies (which were available) but not the inner city case studies (which were not available then).

More often than we anticipated, a writer would need to go back and re-read each case study again and again. It was inefficient but the best mode of operation we found. Often a circulation of a chapter draft would draw a flood of cross references to details in other chapters. Weekend writing conferences helped this process on two occasions. The digesting, coding and analysis of the case studies was not accomplished as early as intended. Ultimately this reduced the number of sessions we had intended engaging in to go over and over the assimilation statements, refining and correcting them.

We found Rob Walker's rule, "a day at home writing for every day in the field" to be an underestimate of what was needed. Francis Stevens (a site visitor) reported needing several weeks of writing after a day and a half and 20 hours of tape from the field We know that we ought to be able to provide case study data to sponsors in less than eighteen months but we kept finding steps that needed more time than we allowed ourselves.

ASSIMILATING ISSUES ACROSS SITES

The task of the assimilation chapters was set as one of advancing understanding of issues across sites. We decided early to concentrate on the five or six most dominating and interesting themes that ran through the case studies. We expected this synthesizing of data would address most of the explicit questions raised in the RFP. While major themes that emerged in the story subsumed many issues raised in the CSSE proposal, we found ourselves short of the grand schemers and writers that this approach required. Our major themes were reduced to Student Heterogeneity, Quest for Uniformity, Back to the Basics and Socialization as a Preemptive Aim. These were written up by Bob Stake and Jack Easley.

Jack Easley and Bob Stake preferred different approaches to the task. Easley wanted to use the case studies as background or platform for studying the mechanisms of rejection often encountered by curriculum project and other teacher support efforts. He chose to concentrate more on site visit reports, to do more of a policy-analysis study, adding other data to CSSE data, rather than to digest further the already well-digested case studies.

Bob Stake wanted to continually draw the reader's attention to the case studies, saying we know many scenes are particularistic or ambiguous but the interpreted information about science teaching and learning is likely to be of more value to the reader than aggregated or interpreted information would be.

At times we found ourselves turning the assimilation chapters into an elaborate indexing task. We looked for what we thought would be more useful to NSF personnel and panels but found our acquaintance with them an inadequate guide. We asked ourselves "What would a curriculum supervisor, a teacher or a principal be interested in knowing?" and then searched for this information. We looked at principal findings in the survey on a particular issue and checked for counter messages in the case studies. Sometimes there were counter messages. We considered the survey from a case study point of view and could on occasion find counter messages there also.

In one memo a CSSE staff member said:

> This business of assimilation is tedious and discouraging. There is a strong temptation to read more into the reports than is there. When you look hard at what is there you see a different story in each of the several case studies. The vitality of each quickly disappears as you try to aggregate the findings on an issue. You wish that the observers had been much more closely in touch with each other, paying attention more to the same things--but you quickly doubt whether then they would have watched what really was happening out there. The demands of research for repetition of happening and the uniqueness of educational acts seem to be an immovable object encountering an irresistible force.

We hesitated, fearing the too simple presentation. Sometimes it is best to encourage more common perspectives. But standardization of purpose and procedure can be a harmful restraint upon research, both in doing and reading about it.

Difference in Co-Directors' Emphasis. A few lines back we noted a difference in purpose of the assimilation chapters. The difference manifested itself in orientation toward theoretical vs decision oriented findings that co-directors Easley and Stake had.

The mind-set of teacher or coordinator was the interest of Jack Easley, a member of the Committee on Culture and Cognition. He stated it this way in the proposal to NSF:*

> Teachers have images of what science is, what mathematics is, what the social sciences are. Those images tend to be formed by carrying out their responsibilities in the classroom. The images are personal. Teachers differ. Teachers differ from curriculum developers and others. . . .
>
> Solutions are not likely to be effective without a better partnership between the scientific community and the schools. . . .

Bob Stake, Director of the Center for Instructional Research and Curriculum Evaluation, was interested in curriculum evaluation and the context "frame factors" of education, especially as perceived by practitioners. He stressed that the perceptions of teaching should remain recognizable to the teachers even at advanced stages of interpretation. This is difficult to do when discussion passes into a theoretical stage. He wrote in the proposal to NSF:**

> The primary aim is to develop a sympathetic view of the situation in schools as seen by the persons who spend their time working there. If this situation is made more difficult or less difficult by outsiders (citizens, scholars, government agencies) we want to document that part of the situation too. The undeniable aim of these studies all over the country (and abroad too) is to make policymakers who deal with many schools sensitive to the possible effects their policies may have in schools which resemble in significant ways the particular schools studied here.
>
> The understanding of science in the country today depends on a drawing out of the issues in the classroom and across the community, and in interpreting them when possible in terms of the more abiding issues.

---

*Proposal to NSF, p. II-1a.

**Proposal to NSF, p. II-3e.

In a particular chapter of the final report Jack Easley developed implications for a theory of teaching and learning (Chapter 16). He noted with disappointment that these particular areas of interest were not as extensively investigated by field observers as he had expected. He wrote:

> One of the consequences of our design, in which we selected ethnographers, is that we managed to find a considerable number of very talented, creative writers who approached their task in various ways, and interpreted our presentation of project goals in various ways. Consequently, on some issues the case studies have to speak mainly for themselves. This does not mean that we cannot present general findings, but just that some of these general ideas are not directly traceable to any particular portion of the case studies, either collectively or individually. Our general findings presented here are mostly the creative synthesis of the coordinating staff who worked with ethnographers, collected data on site visits, and discussed the issues that were emerging from the complex interactions with very talented and diverse scholars. The case studies themselves bear some influence of these interactions, but again the influence is interpreted in creative diversity. This particular discussion, therefore, is simply a digestion and resynthesis (analogous with assimilation) of a variety of parallel activities in eleven sites and involving some thirty-odd scholars and experienced school observers. Each case study on the other hand, is an assimilation of a concentrated interaction with personnel working in a given cluster of schools and of a much more limited interaction with project staff and other ethnographers.*

Stake said:

> I organized the field observer orientation sessions and drew up the conceptual structure for the survey. Thus these efforts might have served only my aims and not Jack's, but I was pleased to see that he found much in both places relevant to his basic questions.

Most assimilation chapters use the case studies as the primary data source for a description of issues, relying on site visit reports for confirmation, instances of exception or additional information. One section of the chapter, The Teacher In The Classroom, differs methodologically. It primarily uses the site visit reports for a theoretical explanation of one particular issue, "Why teachers are reluctant and even hostile toward the best efforts of scholars to help them."** For this issue the case studies provided supportive statements but not as much confirmation as was desired. Surprisingly, perhaps, the preparation of the executive summary turned out to be a relatively easy task, with essentially no disagreement as to what should be said.

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*Jack Easley, Chapter 15:d-1.

**Jack Easley, Chapter 16:1.

Interpretation. In any study, interpretation of observations is a constant activity of the responsible researcher. To many people, the case study and the assimilation of case studies seem overly subjective, overly interpretive, especially during the data gathering phase. And many find the final product underinterpreted, too susceptible to numerous interpretations.

We tried to restrain interpretation during data gathering and not to impose our interpretations too much during the assimilation. Only under pressure from the NSF did we prepare an executive summary (Chapter 19). We found this to be an opportunity to make one synthesis and encouraged readers to make others. We limited our recommendations to what we saw as directly following from the observations.

One advantage of the case study method is that it fits a reader's experience and thinking patterns. To be highly interpretive interferes with readers making their own interpretations.

> Good research needs skeptical thinking and systematic replication. What is missing in case study work is automatic, built-in cautiousness, much as you have in statistical testing of the null hypothesis.
>
> And so it's too likely that a reader of case study research will overinterpret the findings, presuming them to be relevant where they are not. In other words it is likely they will make Type II errors.
>
> But they will make Type I errors, rejecting relevant findings on false grounds. City school principals, for example, almost automatically reject findings from rural settings.
>
> But we might raise the question, "How much of the burden of being skeptical and systematic should be born by the researcher?" If the researcher is too cautious, the public cannot find out about his/her insights. It is not possible for the researcher to assume too large a share of the burden, by refusing to draw in the experience of the reader.
>
> The case study researcher does not guarantee that the reader will have an equal share in the interpretation, but it is common for responsibility to be shared between case study researcher and reader.

We have provided yet another step to this process of interpretation in the assimilation chapters. In many ways the case studies stand by themselves. It is by reading the case study that readers have the opportunity to make their own judgments as to the adequacy of the proof and the degree of confidence to be assigned the statement in the assimilation section.*

Audiences and Indexing. In addition to multiple observers, multiple data sources and multiple authors as well as multiple topics, we have anticipated multiple audiences. Recognizing that our primary audience is NSF and their concern for the questions in the RFP did not preclude recognizing the potential interest in and usefulness of this report to people throughout the educational and scientific communities.

As the writing, analysis and rewriting progressed, the reorganization, modification and finally settling in of various chapters took place. It was during this process that the need for indexing of topics took on importance. Not feeling comfortable with saying specific chapters will be of interest to specific groups of people, extensive indexing was provided for readers to make their own selections as to what to read.

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*Writing the Executive Summary led us further than expected into "seeing" the larger social system in which science education is embedded. It inspired Jack Easley to undertake further research in this direction. (Details available from him personally.)

CRITIQUES

Critical reviews of preliminary drafts of this report had started to come in as this final draft was completed. Several of those reactions expressed concern about the methods used, and seem worthy of attention here. One reviewer said:

> You chose to include some observations in the summary and to exclude others. The basis for your choice in these matters would be interesting to know. That is, TRUTH could not be the criterion--because there are probably a number of truths that you did not include. For instance, my guess would be that the science faculties in secondary schools are male dominated. You didn't cite that TRUTH. You did say that the teaching is "text-book" oriented. Why the one and not the other? The reason might be called "bias;" that is, you were biased towards observations of the one sort rather than another and the bias appears to me to be basically unsympathetic to teachers.

There is of course a great deal of subjective judgment in selecting emic issues. We tried to include some of our criteria on page C:29. Given the people we observed, the organization which sponsored this work, and the audiences we anticipated, we tried to attend to what was meaningful and would be useful to them. We were also accused of being too sympathetic to teachers. Of course there was some bias on both sides in the eyes and words of those many people who helped shape this final report.

The National Science Foundation asked a panel of four to review the preliminary drafts. One of these reviewers, lavish in praise for much of the report, noted that the report would be limited in some of its intended utility:

> Thus, CSSE likely will be unsettling to conventional policy formation practices. It certainly cannot be the "fall guy" for actions taken by policy makers. CSSE, to the extent that it honestly portrays the reality of science teaching, does not present a rationale in favor of or against major policies. Policy makers may fault CSSE for its failure to portray reality correctly (although I believe that charge would not be justified).

Although we failed to review particular NSF policies in this research, and were not encouraged to do so, our findings are indicative of merit and shortcomings in past and present NSF policies. There is substantial support here for future efforts to help teachers directly, including a continuation of teacher training institutes. There is little support for a continuation of efforts to support curriculum reform or for new efforts to develop instructional testing activities. We could have made more direct statements of this sort, but we felt that such simplistic findings discourage review of the circumstances needed to accommodate a policy to complex realities.

A second reviewer on the panel concluded that the CSSE information "will not be useful to science, mathematics, and social studies professionals because the information is based on research with vitiating flaws in design and execution."

> Much of the writing in the case studies mixes facts, inference, and opinion with little warning to the reader. Little is said about how many teachers and students were interviewed, what the specific questions were, how many hours were spent at each school, and other obviously important points. What is more there is little explanation of how anecdotes and quotes were collected and selected. Since the complete raw evidence is not presented, one has to guess at how anecdotes were selected. Do they simply exemplify the conclusions and opinions of the authors? Certainly a single instance does not prove a point; and the instances are insufficiently numerous or explicitly cross-checked to build up a creditable generalization.

Whether or not this report will be useful to professional educators and others is an empirical question. The interest shown so far seems high, but that would not yet indicate that the information is of high quality.

This critic implied that a good research report is highly explicit in its description of researcher behavior. He presumed that this study should be judged on the basis of its contribution to science. He showed little sympathy for the claims we made in this chapter for the validation of observations. (It was an earlier draft he reacted to.) His standards are high, but his definition of educational research is narrow.

In revising this chapter we did not answer his questions. Except for one, his questions are trivial. Had we documented every moment, every interrogation, every possibly meaningful raised eyebrow and facial tic, we would have contributed to a methodologist's inventory, but we would have substantiated our findings little more than we did.

The final question, "Do they simply exemplify the conclusions and opinions of the authors?" is not trivial. It stood before us throughout the two years of work and it will continue to bedevil the authors. Chapter 19 does state our conclusions, of course, but are they sufficiently based upon representative happenings of science teaching and learning today? We do not know. We have insisted on looking at some issues that are too complex to be handled with standardized methods. We have insisted upon telling of rare instances that seemed to have special meaning. We have interpreted ordinary events in some unusual ways, knowing that others will interpret them differently. Some of our offerings did not lend themselves to what that reviewer considered "scientific."

Recently, Henry J. Aaron wrote* that

> policymakers or laymen should and do use research findings as only one among many kinds of evidence, including past research and commonsense beliefs, in deciding what public policies to support. They do not, and should not, apply the same tests of statistical significance commonly employed by analysts in testing hypotheses, but rather should act on the weight of all the evidence. The analysts can help raise the standards of admissible evidence; they can enrich and deepen understanding of the complexity of problems and the unintended consequences of action.

It seems less important to ask if these case studies met scientific standards than to ask if they added to understanding. Neither one depends on the other.

As we completed our work the fourth panelist had still not responded, but the third had this to say:

> The major advantage of this anthropological approach is that the researcher can become a participant observer of the phenomenon being studied. In these studies a researcher visited and lurked in particular school settings to document the status of science education. How better to describe what is happening in these schools! The disadvantage is that comparison and evaluative type statements cannot be made.

That is, to be sure, one of the trade-offs. A well-validated judgment or precise comparison is not available from such studies. The study cannot be the arbiter. As one of the other panelists noted, it leaves it up to the reader and the policy maker to make their own comparisons, interpretations, and policy decisions.

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*Henry J. Aaron, Politics and the Professors: The Great Society in Perspective (Washington, D. C.: Brookings Institute, 1978) p. 166.